



NASHIK MUNICIPAL CORPORATION

Environment Status Report
Year 2019-2020





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Chapter 1

Introduction of Environmental Status Report

The ESR is a comprehensive document that serves as an information resource base for identification of critical issues and also as an input for new city/ town development plans or even revisions in them. ESR attempts to identify current and emerging environmental concerns as well as opportunities at the town level. It does this through the identification of demographic, social and economic driving forces behind various issues that can pose risk to environment and health and safety of citizens.

ESR aids to seek new norms for environmental development. Secondly, it assists in preparation of the equal outline and evaluate the environmental development of the city as per the given norms. Nashik Municipal Corporation has taken a lead step and has been actively involved in preparation of **Annual Environment Status report** as per the state level legislation (The MMC Act) following the 74th Constitutional Amendment Act and the 12th Schedule.

Environmental Status Report (ESR) 2019-2020 shows the current status of environment in the Nashik city. In this report, information of various surveys and detailed measures for conservation of environment have been incorporated. This report is prepared on DPSIR method of the guidelines given by Maharashtra Pollution Control Board.

1.0 Urbanization in India and Maharashtra

As per Census 2011 (Table 1.1), the total population of India is 1,210,193,422 or 1210.0 million population. For the first time since independence, the absolute increase in population is more in urban areas than in rural areas. As per this census record, out of total population, 31% of population is living in urban areas. Population in Maharashtra is divided equally in rural as well as in urban areas. Out of this, around 45% population live in urban areas. This percentage is more as compared to the India's total urban population.



Table 1.1-Population Census of India

	Year 2001	Year 2011
India	102.9 crores	121.0 crores
Rural population	74.3 crores	83.3 crores
Urban population	28.6 crores	37.7 crores

Source :Census of India 2011

- Distribution of Rural and Urban population : 68.84% (Rural)& 31.16% (Urban)
- Level of urbanization increased from 27.81% in 2001 Census to 31.16% in 2011 Census
- The proportion of rural population declined from 72.19% in 2001 to 68.84% in 2011

The state of Maharashtra is having 50.8 millions of urban population which occupies the first place in india with a share of 13.5%. This percentage is the largest as compared to other states of India.

1.1 Municipal Environmental Problems

Urban environmental issues encompass inadequate water supply, treatment of wastewater and solid waste, energy, loss of green and natural spaces, urban sprawl, pollution of soil, air, traffic, noise, etc. All these problems are major concern in developing countries and countries with economic transition, where there is a conflict between the short-term economic plan and the protection of the environment. Maharashtra has been within the forefront of economic development and is commonly referred to as the economic power house of the country. However, speedy growth of urban population is exerting tremendous pressure on the natural resources and concrete services. Loss of natural resources, deteriorating air quality, impure water resources, increasing solid waste in urban areas, inequitable distribution of urban services, increasing economic condition, regional inequality, etc., area number of the environmental problems common within the State.



1.2. Need of Environment Status Report (ESR)

Due to the enhanced industrialization and education facilities, the people are drawn towards the Nashik city. The increased immigration from other region of the country has contributed to the population growth in the city which in turn has a deteriorating impact on the environment. Loss of green cover area, deteriorating air quality, polluted water resources, solid waste disposal in urban areas are some of the common and major concerns arising due to rapid growth of urbanization creating tremendous pressure on the natural resources and urban services. ***Day by day the problems are aggravating in the city, thus to investigate the exact reason, the Urban Local Bodies (ULBs) in Class I cities are required to publish an annual Environmental Status Report (ESR) which will indicate the status of environment management in the city and identify the areas where mitigation measures are required to be considered.***

The ESRs are submitted to Ministry of Urban Development (MoUD) and follow Maharashtra Pollution Control Board (MPCB) guidelines for preparation. It is necessary to use limited resources for sustainable development. This Environmental Status Report is prepared after comprehensive analysis of all the issues related to pollution of air, water, and soil and its impact on human life and the impact of the city, its causes and measures to prevent it.

1.3. Objectives of ESR Preparation

The main objectives of preparation of ESR report is to :-

1. Evaluate the status of all the environmental parameters of a city in order to prepare short term and long term action plans to protect the environment.
2. Highlight the conditions of the biophysical environment in the city.
3. Analyze trends or changes in environment of the city.
4. Identify the causes of change in urban environment.
5. Assess and interpret the implications and impacts of the trends in urban environment
6. Check adequacy of existing available environmental facilities.
7. Set the process for public involvement.



8. Develop action plans based on partnerships.
9. Set targets, allocate responsibilities and appointing institute for monitoring and tracking mechanisms.

1.4. ESR Methodology:

The preparation of the ESR 2019-20 is based on the participatory approach involving consultant and different stakeholders (Fig 1.1).

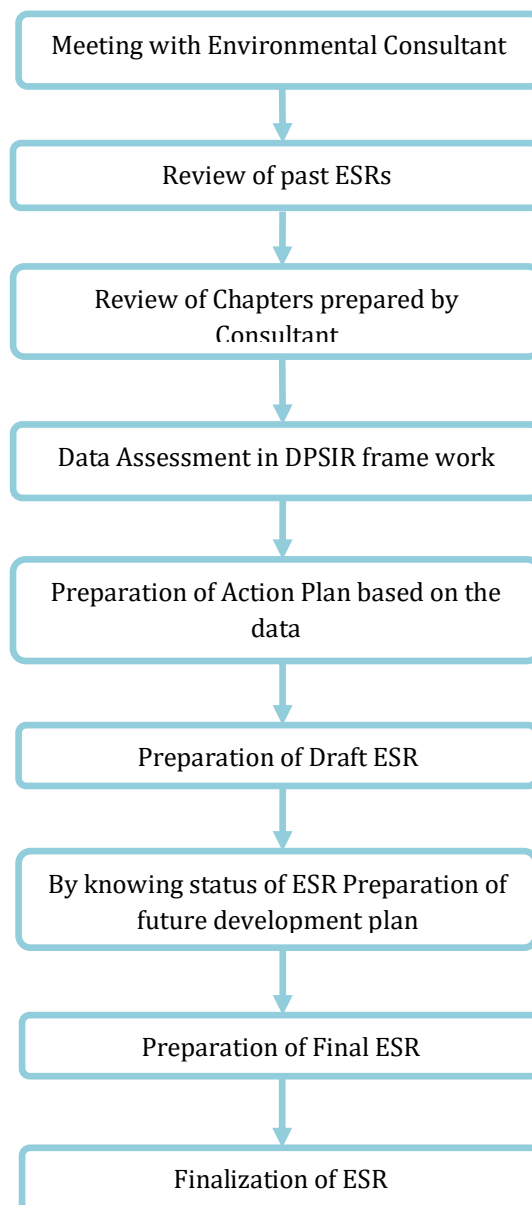


Fig 1.1- Schematic representation of ESR methodology



1.5. Linking ESR preparation to Strategic Planning

The ESR should carry a blue print of Vision to Action. The DPSIR Framework and the Strategic Planning Process should form two convoluting circles intersecting at Pressure and Response (Fig 1.2).

DPSIR Frame work :

D–Development – Urbanization

P – Pressure – Stress on infrastructure

S – Status – Present Environment status

I – Impact – Impact on environment

R–Response – Efforts taken for conservation of environment

There are different types of frameworks, which include environmental media framework, issues framework, sector framework, process framework, etc.

The DPSIR framework used in this situation analysis, assumes cause-effect relationships between interacting components of environmental, social and economic systems. This framework attempts to effectively report the complex interrelationship between the causes of environmental impacts and their effects. As a result, the DPSIR framework leads the way towards Strategic Action Planning.



Fig 1.2- The relation between DPSIR Framework and the Strategic Planning Process



1.6 Environmental Performance Index (EPI)

Purpose :

The **Environmental Performance Index (EPI)** is a method of quantifying and numerically marking the environmental performance of a state's policy (Table 1.2). This index was developed from the Pilot Environmental Performance Index. It was first published in 2002, and designed to supplement the environmental targets set forth in the United Nations Millennium Development Goals. The EPI was preceded by the Environmental Sustainability Index (ESI), published between 1999 and 2005. Both indexes were developed by Yale University & Columbia University by World Economic Forum & European Commission Joint Research Center.

Table 1.2- Environmental Performance Index (EPI)

Objectives 1.	Environmental Health			
Policy categories	Environmental Burden	Effects of Water on Environment	Air Pollution (Effects on Environment)	
Indicators	i. Environmental burden of disease	ii. Adequate sanitation iii. drinking water	iv. Indoor air pollution v. Urban particulates vi. Local Ozone	
Objectives 2.	Ecosystem Vitality			
Policy categories	Air Pollution (effects on ecosystems)	Water	Biodiversity and Habitat	
Indicators	vii. Regional ozone viii. Sulphur Dioxide emissions	ix. Water quality index x. Water stress	xi. Conservation risk index xii. Effective conservation xiii. Critical habitat protection xiv. Marine Protected Areas	
Objectives 3.	Productive Natural Resources			
Policy categories	Forestry	Fisheries	Agriculture	Climate change
Indicators	xv. Growing Stock	xvi. Marine Trophic Index xvii. Trawling Intensity	xviii. Irrigation Stress xix. Agricultural Subsidies xx. Intensive Cropland xxi. Burnt Land Area xxii. Pesticide Regulation	xxiii. Emission per capita xxiv. Emissions per electricity generation xxv. Industrial carbon intensity



For preparation of ESR 2019-20, we have considered around 65 indicators related to environment. Detailed information of these indicators is given in this report. If the EPI index is high, it means, the city is good in terms of environmental conditions. From all 44 indicators, in this chapter we have considered the indicators such as, city development (Economical, industrial, population and area expansion), natural resources (Land, air, water, energy etc.) urban facility (Water, sewage management, solid waste management, transport communication) initiative taken to improve the environment (environment awareness, slum rehabilitation, transport improvement) etc.

In order to determine environmental coordinates, four thematic indicators have been considered.

1. Population growth
2. Resources current status
3. Basic facilities of the city
4. Step taken for environmental support by city .

1. City development

This is the main point of Environmental performance index (EPI). For city development these four points are considered

- a. Population growth
- b. Economical growth
- c. Industrial growth
- d. Geographical growth

2. Current status of resources in the city

At the time of comparing the current resources status of city, 4 main points are considered

- a. Land use
- b. Air monitoring, noise level and water monitoring
- c. Energy usage
- d. Human resources



3. Basic facilities of the city

Basic facilities is considered one of the important coordinator, it includes following points;

- a. Provision of water supply in city
- b. Sewage treatment management
- c. Solid waste management
- d. Transport improvement facility provision

4. Initiatives taken by city for environmental conservation

Initiatives have been taken by the city for environmental conservation which includes

- a. Environmental awareness and education
- b. Solid waste management
- c. Slum rehabilitation
- d. Transport
- e. Water supply management.

Based on the above observations, Environmental Status Report 2019-20 has been prepared.



Chapter 2

Review of the past three year's ESR

Preservation, security and amusement of regular habitat in Nashik city is the premier point of Nashik Municipal Corporation. The Municipal Corporation is taking steady endeavors for improving the living standards of the native residents. Past 3 ESRs of 2016, 2017 & 2018 are reviewed.

The Nashik Municipality was established in the year 1969 and later it was transformed as Nashik Municipal Corporation (NMC) in 1982. NMC has been involved in preparing ESRs since 2002. The reports includes all the components of natural resources like air, water and noise pollution, land management etc., and details of environmental infrastructure and services such as solid waste management, water supply, sewage and sanitation, education and health care facilities, transportation, etc.

The ESR for 2012 has been revised as per MPCB's guidelines for ESR preparation. The ESR uses the data from ESR 2012 and is restructured as per the D-P-S-I-R Framework (Driving forces – Pressure – State – Impacts – Responses).

2.0 Review of Past ESR Reports

NMC is taking steady endeavors to give basic social services to natives for a cordial life and upliftment of their way of life. ESR is set up for check of Environment status in view of various criteria and setting up needs for execution of here and now, and long haul condition agreeable measures. Past 3 ESR's of 2016, 2017 & 2018 are reviewed.

2.1 Urbanization

Population projection is not only done to foresee future population but also to gauge future demand for food, water, energy, and services. There are several population projection methods available. Growing industrialization is responsible for the increasing rate of hazardous components and non biodegradable waste, resulting in increased pollution load. Additionally, sewage, atmospheric pollution and land pollution load has also increased manyfold. Growing



population and urbanization leads to increased exploitation of natural resources which cause harm to environment. Due to growing urbanization and population growth, the number of vehicles in the Nashik City is also drastically increased. The number of buses are nearly the same in the years 2015 to 2018. The distribution is given in Table 2.1.

Table 2.1- Number of city buses for Public Transportation

Sr. no.	Particulars	2015-16	2016-17	2017-18	2018-19
1.	No. of buses	195	194	196	158
2.	No. of routes	508	508	508	508

Source: MSRTC Nashik bus depot

No major changes are seen in city buses public transportation facility in last three years.

2.2 Health and Hospital Facility

In Nashik Municipal Corporation, the medical center facilities of NMC encompass Dispensaries, Family Planning centres and vaccination centers (Table 2.2).

Table 2.2 - Medical center facilities from Last three years

Distribution	2015-16	2016-17	2017-18	2018-19
Municipal hospitals	04	04	04	04
Maternity homes	08	08	08	08
Blood bank	01	01	01	01
Family Planning Centers	11	11	11	09
Leprosy Unit	01	01	01	01

Sources – Health Department, NMC

2.3 Educational Facility

From 2013 to 2018, the total number of primary and secondary schools remain same, also number of students decreased slightly whereas considerable change is seen in the number of teachers (Table 2.3).



Table 2.3 - Primary & Secondary school details

Particulars	2014-15	2015-16	2016 - 17	2017-18	2018-19
No. of Primary & Secondary Schools	140	140	140	140	101
No. of students	36613	36531	34982	36205	29702
No. of teachers	978	1042	1006	1015	941

Source:-Education Department , NMC

2.4 Water Supply

During the last 8 years, about 1212 bore wells were dug in Nashik Municipal Corporation area, in which 918 hand pumps are installed. In Nashik city, Surface water sources primarily consist of Godavari River, Waldevi River and Darna River. Godavari river, having a length of about 19 km, flows through the central part of the city. Similarly Waldevi River having a length of about 16 km in the north and Darna (3.5 km) flowing through south east direction of the Nashik municipal corporation area (Table 2.4).

In order to treat river water and make it potable for supplying good quality water to the citizens, NMC has constructed head works for drawing water from Godavari River & distributes to the entire city after treatment. Treated water from water treatment plants is supplied to citizens through closed pipelines.

Table 2.4 Status of water supply in past years

	2013-14	2014-15	2015-16	2016-17	2017-18	2018-19
Population (Approximately)	1609646	1770814	1940625	2096053	2106150	2270000
Water Supply (MLD)	368.46	396	379.78	367.86	434	481.78

Illegal connections and use of booster pumps is more at tail end which causes contamination of whole line. To achieve 24 X 7 water supply within Nashik Municipal area, automatic water meters, water auditing, avoiding water leakages, use of automatic SCADA facility and improvement in water distribution will be implemented.



2.5 Sewerage System

In the last ESR of year 2018-19, it is mentioned that an all-inclusive master plan for sewage system has been affirmed for the city. Five STP zones are operational, namely, Tapovan, Panchak, Agar Takli, Chehedhi and Gangapur. One additional STP is in progress-namely Pimpalgaon Khamb. Gangapur STP and Pimpalgaon STP are approved under AMRUT. Gangapur STP has been made operational in December 2019. The STP for Pimpalgaon Khamb is in progress & is planned to be commissioned in two years.

2.6 Solid Waste Management

For proper management of solid waste, Solid Waste Management Handling Rules 2000 and subsequent amendments (2016) are being strictly followed. Waste generated in Municipal Corporation is disposed off by using various technologies given as below:

- i. Mechanical Compost plant
- ii. Diesel production using plastic
- iii. Capping by using scientific technology
- ii. RDF composting
- iv. Landfilling by using scientific technology

Solid waste generation for the past 4 years are shown in the Table 2.5 below.

Table 2.5 - Solid waste generation in Nashik city during last four years

	2014-15	2015-16	2016-17	2017-18	2018-19
Quantity of waste generated per day (Tonnes)	400	400	500	500	550
Waste collection efficiency	92%	92%	94%	94%	100%
No. of vehicles	129	129	206	206	260

Source:-SWM Department , NMC

2.7 Biomedical waste Management

In Nashik, the work of Biomedical waste management has been outsourced to Watergrace Products to provide facilities of Biomedical Collection, Transportation, Segregation and disposal. Since last 15 years M/s Watergrace Products provide this facility for Nashik District. They collect biomedical waste by visiting door to door in municipal corporation area. All the necessary set ups of common biomedical waste collection, transportation, treatment and disposal facilities are available with them. They provide treatment as per MPCB and CPCB norms.



2.8 Gardens and Lakes

By studying past 4 ESR's it is seen that total number of gardens are 498 in Nashik city developed at different locations. Major gardens are as below:

- i) Somani garden, Nashik road
- ii) Shivaji garden, Nashik
- iii) Nehru Garden, Nashik
- iv) Krushna nagar garden, Panchavati
- v) Ramdas garden, Sharanpur
- vi) Kusumagraj garden
- vii) Kanetkar garden
- viii) Late. Promod Mahajan Garden, Gangapur Road
- ix) Phalake Smarak, Pandavlene
- x) Indira Nagar Garden

2.9 Environment Status

A) Air Pollution

The air pollution in Nashik city is mainly due to vehicular exhaust, industries and construction work. Continuous increase in vehicles is adding to the air pollution. To control the air pollution, Nashik Municipal Corporation has undertaken a number of measures. Road concretization, road widening, tar road, Compulsion on tree plantation to Residential as well as industrial projects, maintaining gardens and road side tree plantation etc. are being implemented by NMC, mandatory PUC for on road vehicles by RTO & Traffic police department.

B) Water Pollution

Water quality from river, nallahs, under NMC area are monitored from time to time. Water samples from rivers are collected from different locations. The nallahs connected to rivers are also analysed for their water quality. Few locations are monitored by Maharashtra Pollution Control Board. Water pollution results when contaminants are introduced into the natural



environment. For example, industries discharge, various anthropogenic activities like washing, bathing, agricultural runoff, etc. The ultimate goal in the control of water pollution would be zero discharge of pollutants to water bodies; however, complete achievement of this objective is usually not cost effective. The preferred approach is to set limitations on waste disposal discharges for the reasonable protection of human health and the environment. ETP must be mandatorily utilized for treating the industrial waste water for its reuse or safe disposal to the environment. In this regard, MIDC is establishing CETP. NMC started environmental eco-friendly Ganesh festival. Plaster of Paris has been dethroned by clay, and synthetic dyes have made way for organic colours.

C) Noise Pollution

During celebrations/festivals, noise making musical instruments, dances and noise making fire crackers are being used. So, during these festivals, the noise pollution level is comparatively high. During Ganesh Festival, Navratri and Diwali festival, noise levels at residential societies are observed well above the prescribed limits. High level noise pollution is observed at residential, Commercial and silence zone in previous three years.

To control noise pollution, NMC has taken the following steps

1. 19 Silence zones at different locations around schools & colleges, hospitals and courts are declared.
2. Noise barriers on construction zones at various places are being implemented.
3. Action is being taken by Police department towards complaints on noise pollution by citizens.
4. Since trees act as 'Noise Buffers', NMC has planted various species of trees in different areas and across the roads.

Conclusion

From comparison of past 3 years ESR Report, it can be concluded that in 2019-20 the pollution level in terms of air, water, noise, etc. is slightly increased as compared to 2017-18 and 2018-19 but well below permissible limits. In addition to this, visible impacts are also seen on human health as well natural environment.



Chapter 3

New Development and Change

3.0 Introduction to Nashik Municipal Corporation (NMC)

Nashik is the third largest city of Maharashtra after Mumbai & Pune. Nashik lies in the northern part of Maharashtra state at elevation of 560 m above the mean sea level which gives it ideal temperature, particularly in winters. The river Godavari originates from the Brahmagiri Mountain, Trimbakeshwar about 32 km (20 miles) from Nashik and flows through the old residential settlement, now in the central part of the city is where from river Godavari originates. Nashik lies on the western edge of the Deccan Plateau, which is a volcanic formation. The land area of the city is about 259.13 Sq Km. Anjaneri near Nashik is the birth place of lord Hanuman. The city's tropical location and high altitude combine to give it a relatively mild version of a tropical wet and dry climate. Temperatures rise slightly in October, but this is followed by the cool season from November to February. The cool season sees warm temperatures of around 28°C during the day, but cool nights, with lows averaging 10°C and extremely dry air.

NMC was established on 7th November, 1982 under BPMC Act 1949. Roughly, the NMC is spread around 260 square kilometer area. The Administrative activities are conducted with the help of six different Ward offices namely Satpur, New Nashik, Nashik (East), Nashik (West), Nashik Road and Panchavati, which provide facilities to the residents of Nashik city. Nashik Municipal Corporation includes villages like Makhamalabad, Mhasrul, Adgaon (North direction), Agartakli, Dasak, Panchak, Nandur, Manur (East), Wadala, Pathardi, Dadhegaon, Pimpalgaon Khamb, Vadner, Vihitgaon, Chehedli, Deolali, Chadegaon (South), Cidco, Kamatwada, Satpur, Anandwalli, Gangapur, Pipalgaon Bahula, Chunchale, Ambad (West). The village map is given below (Fig 3.1).

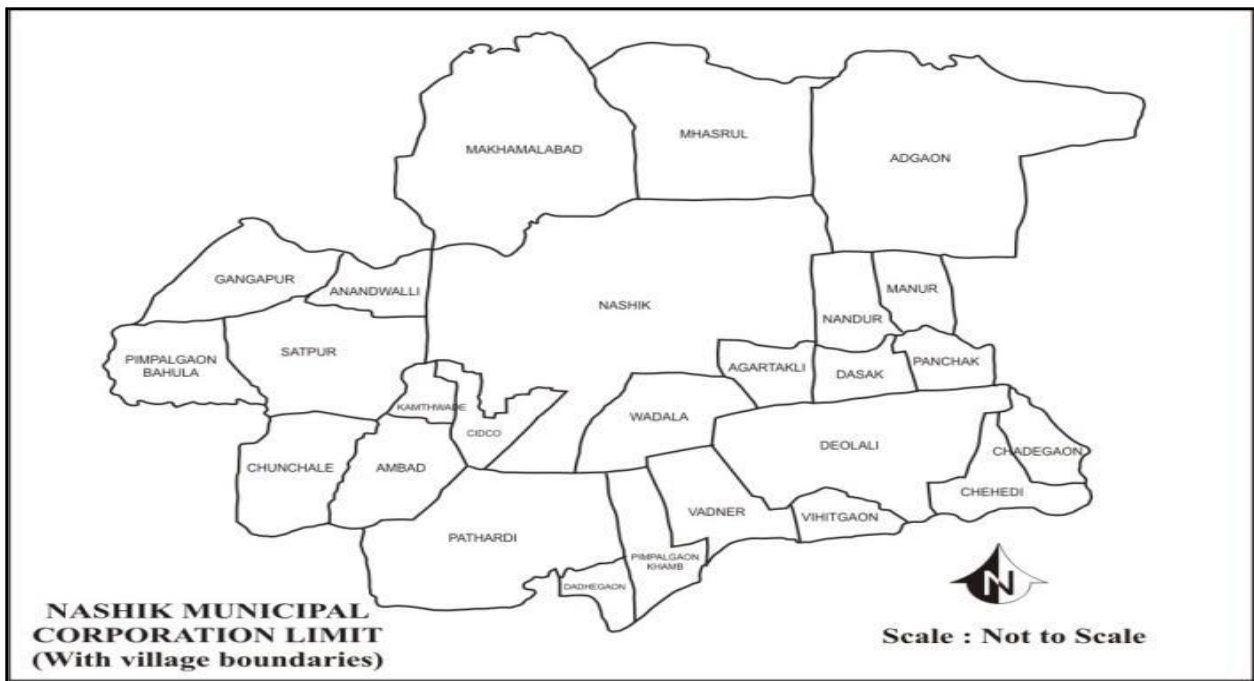


Fig 3.1 - Village map of NMC

Factors that Boost the city (Driving Force) Stress on City (Pressure)

D- Driving Force

1. Population Growth
2. Infrastructure & Industrialization
3. Development & Industries
4. Increasing vehicles numbers
5. Transportation Facility

P-Pressure

1. Number of slums is increasing
2. Increase in Solid waste Management problem
3. Exploitation of natural resources
4. Pollution increase due to industrialization & vehicles
5. Stress on cleaning services



3.1 Profile of the City

Nashik is one of the most important cities of Northern Maharashtra. Nashik in Maharashtra is situated on Golden Triangle (Nashik-Pune-Mumbai) about 180 km from Mumbai and 210 km from Pune. The city has become the center of attraction because of its beautiful surroundings and cool and pleasant climate. Nashik city has got historical, social, mythological importance from ancient period. The river Godavari originates at Trimbakeshwar and flows through the city. Temples and ghats on the banks of Godavari have made Nashik one of the holiest places for Hindus all over the World.

Nashik is well known for the event, every twelve years Simhastha 'Kumbhamela' a religious festival held in Trimbakeshwar and Nashik. The Nashik Kumbhmela is generally acknowledged to be the most sacred of all the festivals. This city is also having agricultural importance because of exports of grapes and onions.

Nashik city is divisional headquarter having 13 Talukas represented by Nashik Municipal Corporation situated at 565 meter above sea level. Nashik is surrounded by other districts Jalgaon towards East and North East, Dhule towards North, Thane at its South West and West, Aurangabad region at its South East and Ahmednagar towards South. Salient Features of the city are given in following table 3.1.

Table 3.1 - Details of Nashik City

Sr. No.	Description	Details
1	Municipality Establishment	1864
2	Corporation Establishment	7 November 1982
3	Total Area	259 Sq. Kilometers
4	Latitude	20° 0'2.61" N
5	Longitude	73°46'31.89" E
6	Altitude	560.61 m above Sea Level
7	Population (Census 2011)	1,486,053
8	Population Density	6200 per sq.km.
9	Average Rainfall	1233.6 mm
10	Temperature (Average)	24.7° C
11	Number of Villages within Municipal Corporation	22
12	Rivers Flowing through city	Godavari, Nandini , Darna, Waghadi, Waldevi, Kapila



13	No. of Wards	31 (As per 2017 Election)
14	Number of Corporators	Elected Members 122 Nominated Members 5 Total Members 127
15	No. of Ward Offices	06 Satpur, CIDCO, Nashik (East), Nashik (West), Nashik Road, Panchwati.
16	Slum population (as per census 2011)	199506
17	Number of Slums (as per 2002)	159
18	Corporation total Secondary school	13
19	Corporations total primary school	92
20	Public library of corporation	14
21	Swimming pool	05

Source: NMC Website

Nashik is one of most industrialized city of Maharashtra after Mumbai and Pune, mainly due to extensive industrial development since early seventies. Nashik city started developing with establishment of two industrial areas i.e. Ambad MIDC and Satpur MIDC Areas. The engineering and manufacturing industries such as Mahindra and Mahindra, BOSCH, VIP, CEAT, ABB and several pharmaceutical hubs etc., produce huge network of auto components supplier and ancillary services. Nashik Thermal Power Station, National Treasury Printing Press (Security Press), Hindustan Aeronautics Limited (HAL), Nashik Road Railway Station, Indian Army's Artillery Center (Deolali Camp), etc. play important role in the development of Nashik City.

3.2 Population Projection

Population projection is done to foresee future population. There are several population projection methods available. Since the last two decades (1991-2011) the average decadal growth rate is around 50%. Subsequent addition of new areas in NMC shows upward trend. According to the table no. 3.2 and 3.3, the population projected is 22.38 lakhs in 2021 and over 33 lakhs in 2031 **(Fig 3.2)**.



Table 3.2 - Nashik city Population Growth (1901 to 2011)

Sr. No.	Years	Total Population	Absolute Growth	Growth In Percentage
1	1901	21490	-	-
2	1911	30098	8608	40.06
3	1921	38230	8132	27.02
4	1931	45744	7514	19.65
5	1941	52386	6642	14.52
6	1951	97042	44656	85.24
7	1961	1,31,103	34061	35.10
8	1971	1,76,091	44988	34.32
9	1981	2,62,428	86337	49.03
10	1991	6,56,925	394497	50.33
11	2001	10,77,236	420311	63.98
12	2011	14,86,053	408817	37.95

Source: 2011 Census of India, District Census Handbook Nashik District

Table 3.3- Population forecast in Nashik Municipal Corporation

Census Year	Total Population	Decadal Change	Growth Rate
2021	22,38,739	7,52,686	50.65%
2031	33,72,660	11,33,921	50.65%

Population forecasting is done by using Geometric progression method

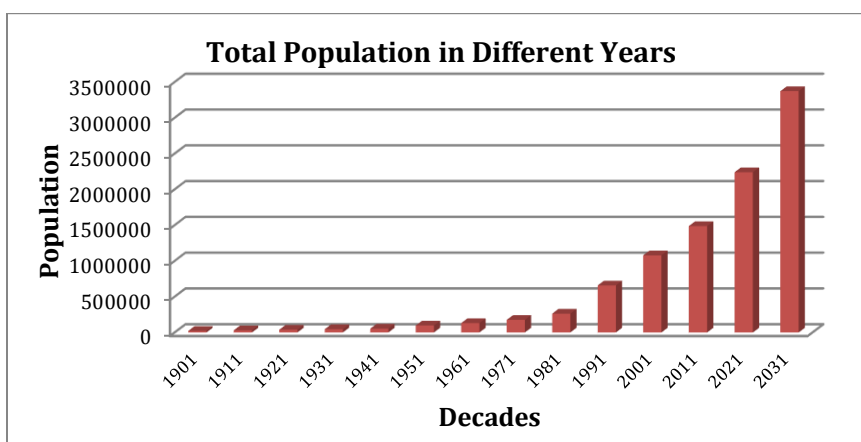


Fig 3.2 - Population Growth



As per DPSIR, 'Population Density' is an important indicator and its objective is to harmonize the annual growth of a city's population. Density of population affects human health in general by spreading diseases more quickly. Increased or decreased pressure on an urban environment illustrates population density growth overtime.

3.3 Highlights of Demography Structure

Literacy Rate:

In DPSIR literacy rate is one of the important points. (Table 3.4).

Importance of Literacy is as follows

- Awareness in people to work towards a better living and to know about the basic human rights.
- Spread knowledge and information around the world.
- Helps to break free of shackles of ignorance, avoid getting manipulated, being left out of the mainstream and build their own identity.

Table 3.4 - Literacy Rate in Nashik Municipal Corporation area

	Total	Percent	Literacy	Percent
Population	14,86,053	100.00	1,178,446	89.85
Male	7,82,517	52.65	6,43,543	93.40
Female	7,03,536	47.34	534,903	85.92

Source: Nashik city census 2011 Literacy data

3.4 Development and Industries

Nashik is one of the main exporters of white onions, grapes and pomegranates. Mumbai-Pune-Nashik is considered to be the most developed **“Golden Triangle” of Maharashtra**, and accordingly infrastructural facilities are being developed by the Government. After the establishment of the Deolali Cantonment Board (1861) and Nashik Road Railway Station (1862), there was a rapid increase in the development of Nashik. Later, Nashik Municipality came into



existence in the year 1864, again Nashik was declared as District (1869), foundation of Saint Andrew Church (1884), Construction of Victoria Bridge was started in (1894), and Establishment of Police Training School (1910), Establishment of Security Press (1927), Establishment of Artillery Center (1941) and Corporation (1982) were and are determined as milestones of Nashik City development.

Nashik city is one of the fastest growing cities in India identified as Tier 2 metro city. With the establishment of Engineering and manufacturing industries, the economy of the city started booming. Apart from enhanced industrialization, progressive agricultural practices in surrounding of city and district also contributed to the economy. During fourth decade of 20th century, the establishment of Walchand group at Ravalgaon was initiated. During pre Independence, Nashik city initiated cottage industry activities like Bidi manufacturing. During post independence, several MIDC were established in and around Nashik such as Ambad, Satpur, Igatpuri, Dindori and Sinnar. The industries like Mahindra and Mahindra, Bosch VIP, Samsonite, Cable Corporation of India, Garware, Crompton Greaves, Siemens, Kirloskar Oil Engine, Caprihans, Gabriel India Ltd., Thyssen Krupp, IBP, PCVL Casting, CEAT, ABB, Atlas Copco, Essar Steel Hypermart Ltd, Jindal Steel, Glenmark are established in these MIDCs. Currently, more than 1300 different units are established in these industrial areas. Manufacturing, Engineering companies and Pharma Companies like Glaxo Smith Kline, Glenmark and Fem are established in the MIDC area. Nashik is also known as grape city in India. According to the production of grapes, several wineries like Sula, York etc. are also established in the corporation area. Nashik city is deemed to be third most industrialized city of Maharashtra. Thermal power plant has been established at Eklahare to supply sufficient electricity.

3.5 Details of Slum areas in Nashik Municipal Corporation area

Total no. of Hutments in Nashik city is 41,023 in which, population of 189,721 resides. This is around 12.77% of total population of Nashik city (Census, 2011) depicted in Table 3.5.



Table 3.5 - Slum Details in NMC Area

Year	Population in Slum area	Percentage of population in slum area	Increase of Slums population
1981	66,498	--	--
1991	75,526	11.49	9,028
2001	1,38,797	12.90	63,271
2011	189,721	12.77	50,924

Source: 2011 Census of India, District Census Handbook Nashik District

3.6 City Connectivity

Nashik city is fourth important city in Maharashtra. It is a part of Golden Triangle of Mumbai-Pune-Nashik.

3.6.1 Road Network

A total of 1901 km of road network exists of which, 257 km are WBM roads, 221 km are Concrete roads, roads in slum areas are 115 km and 1307 km are asphalt roads. The Mumbai-Agra National Highway No. 3 passes through West-East direction from Nashik city, which connects Mumbai (180 km) and Dhule (158 km). Nashik city is connected to Pune (210 km) with National Highway No. 50. Nashik-Aurangabad (180 km) is connected through State Highway No. 30. In addition to that, Nashik city is connected to Jawahar, Kalyan, Peth etc. through state highways. Within the city, an extensive network of all weathered roads exist (Fig 3.3).

3.6.2 Development of Road Network Nashik City

Nashik city was developed because of development of several government offices, industries and historical places. The Simhastha Kumbh Mela is one of the major activities organized after every 12 years, helps to develop road network within the city. The NH 3 passes through city. Most of the development has occurred on both sides of this highway.

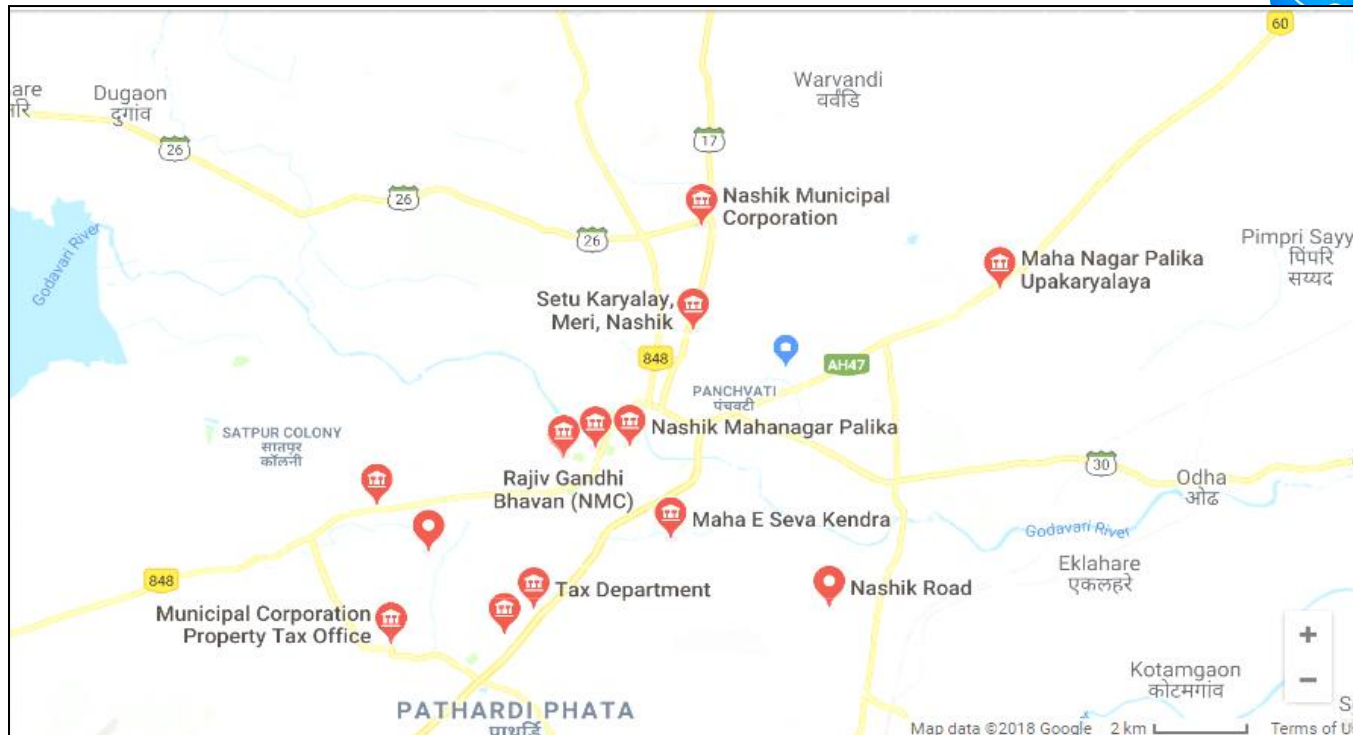


Fig 3.3- Important Road Network Nashik Municipal Corporation Area

The following are the major roads in NMC area

1. Nashik Road
2. Sharanpur Road
3. Gangapur Road
4. Triambakeshwar Road
5. Peth Road
6. Makhmalabad Road
7. Jailroad
8. Nandur Naka to Jatra Hotel link road
9. Satpur Ambad Link Road
10. Gangapur Satpur Link Road
11. Pipeline Road
12. Untwadi Road
13. Old Canal link Road
14. Wadala Road
15. Bytco-Vihitgaon-Devlali

Mumbai-Agra NH-03, in corporation area, originates at Pathardi Phata (West end of Nashik City) and ends at Adgaon (East end of Nashik city). This highway caters most of the traffic load, because this road has 2 tiers i.e. Four lane and service road at ground and four lane fly over (about 10 kilometer) is available to carry traffic load. The NH 50 connects Nashik city to Poona through Dwarka and Nashik Road (5.00 Kilometer). This road handles the traffic load coming from Pune, Sinner MIDC, Nashik Road, etc.



3.6.3 Rail Network

Central Railways Nashik Road Railway Station was established in 1866. The railway station is situated at south-east direction, approximately 10 kilometer away from Nashik city. The Nashik road railway station comes under Bhusawal-Kalyan section. The Important broad gauge lines such as Howrah-Nagpur-Mumbai line, Howrah-Allahabad-Mumbai line, and New Delhi-Bhopal-Mumbai line passes through the city.

In addition to that, a special railway track is available to supply coal to the Eklahara thermal power plant. This power plant is a coal based thermal power plant and requires large number of coal, which is supplied by means of rail transport.

The railway service provides an important means of transportation to daily commuters of Nashik to Mumbai or Nashik to Bhusawal and nearby areas.

3.7 Air Network

Nashik Airport (Ozar Airport) is situated 15 km away from the Nashik city toward north-east direction. Basically, this airport is owned by Hindustan Aeronautics Limited (HAL), which uses this airport for testing of newly build aircrafts. The airlines destinations are Pune, Mumbai, Delhi, Chennai, Bangalore, Hyderabad, Goa; Kolkata, Ahmadabad. Another small runway is available at Gandhinagar area. This airport is known as Gandhinagar Airport, taken over by Indian Army. It was used by Indian Airlines to operate daily flight between Nashik to Mumbai from 1972 to 1989.

S-Summary

Building development grows quickly because of urbanization and industrialization, which has impacts on soil fertility. Agricultural land is utilized for development and constructions. NMC declared a couple of lands as green space and disallowed the utilization of this space for the development purpose. Thick plantation in the zone must be done, so that CO₂ from air will get assimilated. Endemic species like Madhushevga, Neem, Pilmohar, Sesam ought to be planted.



I- Impact

1. Growing industrialization is responsible for the increasing rate of hazardous components and non biodegradable waste, resulting in pollution load. Also sewage, atmospheric pollution and land pollution load has increased considerably.
2. Growing population and urbanization cause exploitation of natural resources which cause harm to environment.
3. Development of Industrialization in city, IT field, and population growth in the city has put considerable burden on transportation which in turn resulted in increased accidental rate and traffic jam problems.

R- Response

1. Under City cleanliness urban plan, Nashik Municipal Corporation has built 2200 Toilets on pay and use basis.
2. Equal Water supply to various parts of the city.
3. Use of Existing Sewage treatment plant for the treatment of Waste water and proper storage and transfer of sewage.
4. Special care to reduce water pollution contributed by slums and industries.



Chapter 4

Land Use

4.0 Land Use and Land Cover Pattern

Land is one of the prime natural resources of the each country. Land use /land cover change is a general term for the human modification of the Earth's terrestrial surface. Although humans have been modifying land to obtain food and other essentials for thousands of years, current rates, extents and intensities of land use /land cover change are far greater than ever in human history, driving unprecedented changes in ecosystems and environmental processes at local, regional and global scales. Today, land use /land cover changes encompass the greatest environmental concerns of human population including climate change, biodiversity depletion and pollution of water, soil and air. (Currently, monitoring and mediating the adverse consequences of Land use /land cover change, while sustaining the production of essential resources, has become a major priority of researchers and policy makers around the world).

Nashik Municipal Corporation lies between **18° 33'** and **20° 53'** North Latitude and between **73° 16'** and **75° 16'** East Longitude at northwest part of the Maharashtra State (Fig 4.1). The Nashik city lies at 560 meters above mean ocean level. Amid 1970, the zone was 12.80 sq. kilometers and now following multi decades, it has traversed 250 sq. kilometer mark. The NMC zone is isolated in to three zones, for example internal zone, center zone and external zone. Regulatory structures, business territory and old city contains inward zone. It has exceedingly clogged local location around Godavari River. The center zone incorporates mechanical foundation and arranged neighborhood. The suburb zones like Gangapur Gaon, Makhmalabad, Mhasrul, Adgaon, Eklahra, Deolali, Pimpalgaon Bahula, Pahtardi and so forth together involves external zone of the city. The city is known for its incredible fanciful foundation. It is one of the four urban communities that have the mega event of Simhastha Kumbh Mela once in twelve years.



D-Driving Force

1. Population Growth
2. Economic Growth
3. Population
4. Currently the existing land utilization pattern aerial & other future policy will effect on land use

P-Pressure

- 1) Lack of space due to population growth
- 2) Due to increase in population, no of buildings and the area required to accommodate them also increased. Furniture requirement involves cutting of many trees which leads to deforestation
- 3) Thus decline in rainfall and increase in pollution occurs



Fig 4.1 - Latitude and Longitude boundaries of Nasik Municipal Corporations



S-Status

4.1 Land Use of Nashik Municipal Corporation

As per the table 4.1 given below, the total developed area in Nashik city accounts for about 78.69% out of total corporation area. Out of total corporation area, about 47.99% area is covered by residential area. This clearly shows that vast areas within the corporation limits are quite developed. About 16.98% areas are under cultivation, 3.39% Water Bodies, 0.94% forest land available on total available land. The total un-developed area is 21.31%.

Table 4.1 - Current land use of Nashik Municipal Corporation Area

Sr. No.	Land Use	Area in Hectares	% of total Developed Area	% of the Total Area
1.	Residential	12835.78	60.98	47.99
2.	Future Urbanisable Zone	442.19	2.10	1.65
3.	Commercial	118.53	0.56	0.44
4.	Industrial	1558.63	7.41	5.83
5.	Public and Semi Public	1059.64	5.03	3.96
6.	Public Utility	293	1.39	1.10
7.	Transportation	2862.9	13.60	10.70
8.	Garden, Play Ground and Recreations	535.84	2.55	2.00
9.	Military	943.75	4.48	3.53
10.	CIDCO	398	1.89	1.49
	Total Developed Area	21048.26	100	78.69
11.	Agricultural	4542.59		16.98
12.	Vacant Land	0.00		0.00
13.	Water Bodies	906.23		3.39
14.	Forest	250.67		0.94
	Total Un-Developed Area	5699.49		21.31
	Total Area	26747.75		100.00

Source: Revised Development Plan 2016-2036 Report

(Published U/S of Maharashtra Regional and Town Planning Act, 1966)

The residential improvement set apart on the current land use delineate, that the pattern of residential development is for the most part towards towns Nashik, Anandwali,



Gangapur, Satpur, Pathardi, Deolali, Wadala, Agartakli, Makhmalabad, Mhasrul. There is premium grade agricultural land stretch along the southern parts of Darna river within the town, farthest reaches of Pimpalgaon Khamb, Vadner, Vihitgaon and furthermore, inside towns Nandur, Manur, Chadegaon, Dhadegaon, Deolali, Mhasrul, Makhmalabad and eastern part of Adgaon. With increasing population, the agricultural lands are getting converted to non-agricultural lands. The commercial activities is mainly observed within the inner zone of the city and mostly concentrated on Main Road, Ravivar karanja, Bhadrakali Stand, Malegaon Stand, MG Road, Chandwadkar Lane, Lam Road of Nashik Road, Deolali area and on Trimbak Road near Satpur, College Road, Canada Corner, Mumbai Nashik Highway, Nashik Pune Highway, City center mall at Untwadi, Junction point of Saikheda Road, Jail Road etc.

Industrial areas constituted about 7.41% of the developed area which mainly covers areas like Satpur and Ambad MIDC, small industrial settlements along Godavari River.

4.2 Land Use of NMC 1981

The land use pattern of Nashik in 1981 and 2011 is given in table 4.2 and 4.3 respectively. Areas percentage is shown as per different categories of land use practices.

Table 4.2 - Land use practices of Nashik city in 1981

Category	Area (in sq.km.)	Area (in %)
Urban or Built-up	7.5	2.89
Agricultural Land	19.97	7.71
Vegetation	44.43	17.35
Waste Land	84.1	32.46
Fallow Land	97.94	37.46
Water Bodies	5.16	1.99
Total	259.10	100

Source: Draft Revised Development Plan 2016-2036 Report

(Published U/S of Maharashtra Regional and Town Planning Act, 1966)



4.3 Land Use of NMC 2011

As per table 4.3 urban area increased and vegetation area decreased tremendously in 2011. Land use & Land cover of Nashik details are diagrammatically represented in the **Fig 4.2**.

Table 4.3- Land use practices of Nashik city in 2011

Category	Area (in Sq.km.)	Area (in %)
Urban or Built-up	98.63	38.07
Agricultural Land	41.96	16.19
Vegetation	10.49	4.05
Waste Land	73.45	28.35
Fallow Land	31.28	12.07
Water Bodies	3.29	1.27
Total	259.10	100

Source: Revised Development Plan 2016-2036 Report (Published U/S of Maharashtra Regional and Town Planning Act, 1966)

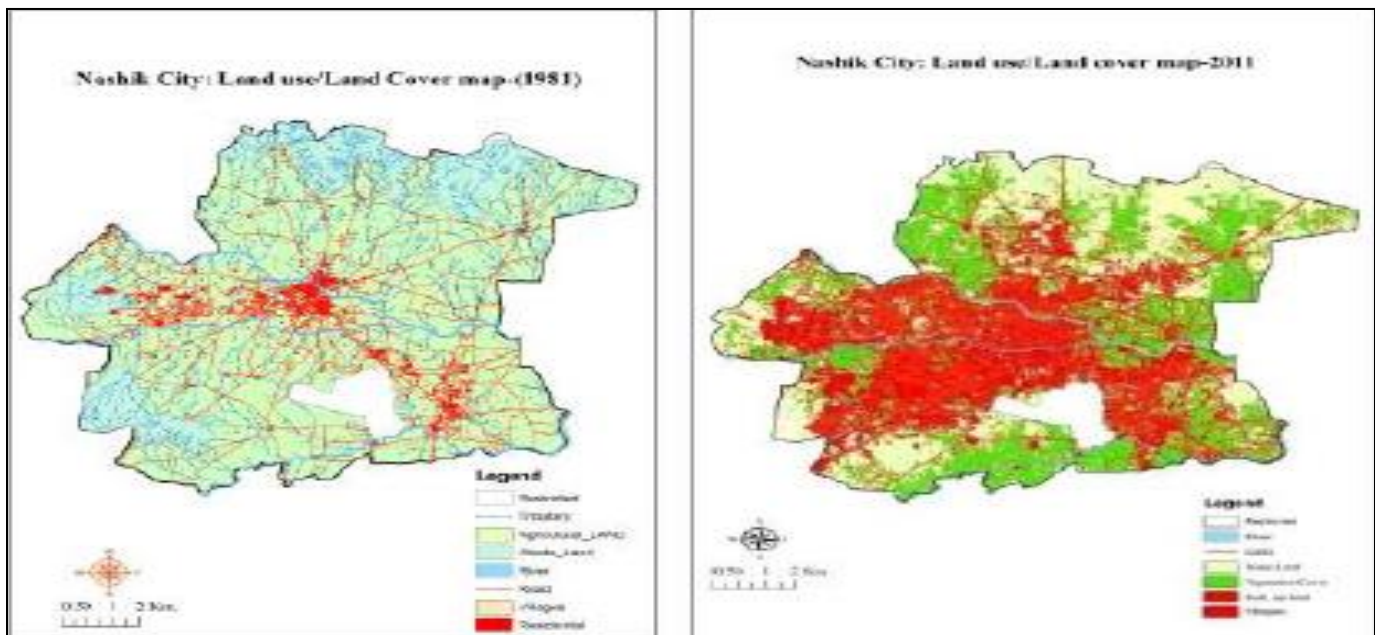




Fig 4.2 - Land use & Land cover of Nashik City in 1981 & 2011

I-Impact

1. Construction

Currently, the city is facing problem of disposal of construction and demolition waste. Nashik Municipal Corporation has floated tender inviting agencies for management of Construction & Demolition waste.

2. Urban Heat Island Effect (UHI)

Heat generated in surrounding city area is defined as UHI. Due to human interference, average temperature in populated areas is more as compared to nearby rural areas. Main reason of this is increasing housing demand & construction activity, which is increasing heat pockets. These are mainly in metropolitan cities like Mumbai, Delhi, Chennai and Kolkata. Due to UHI affect, atmospheric temperature increases & rainfall decreases. It leads to unseasonal rains, acid rains, which affects the human life and biodiversity growth in the city.

3. The compound effect

The large extent of construction activities has also caused a significant impact on the natural resources.

R-Response

- i. Vigilance against illegal dumping of debris
- ii. Addition of Open Spaces



As open spaces in the city helps in reducing the impacts of Urban Heat Island (UHI), NMC has planned to increase the area by adding various open spaces in future. NMC is also taking various steps to avoid misuse of the open spaces.

Plantation scheme:

According to information provided by Garden Department, in the year 2018-19, 12,000 trees were planted. In every year, trees are being planted in NMC area by Garden department, private companies and social institutes. There are 498 gardens under 6 divisional offices, where plantation scheme is being implemented.



Chapter 5

Social Environment

Preamble

This chapter covers every fundamental need like, Health, Hygiene, Education, Transportation, Industrialization, Cultural and Tourism Development, through which advancement of city takes place. Issues influencing these perspectives, their status and extent of progress are additionally canvassed in this area.

Social science is the investigation condition created by people, as stood out from the common habitat; Socio financial aspects is the sociology that reviews how monetary movement influences and is formed by social procedures. As a rule, it dissects how social orders advance, stagnate, or relapse as a result of their nearby or provincial economy, or the worldwide economy. Any town or city or organization or state or nation is socio-monetarily steady or not by contemplating and estimation of underneath components like training, work creation, formation of new administrations, industrialization, urban rejuvenation, country advancement, social mix, manageable improvement.

Driving forces for social transform

- Population growth and Urbanization
- Switch over to alternate business and proliferation of Industrialization
- Change in lifestyle
- Lack of knowledge in people
- Social transformation
- Alteration in economic development
- Breaching of rules and regulations
- Scarcity of sanitation facility
- Overexploitation of natural resources
- Differences in social and economic states



Factors responsible to generate pressure on social environment

- Population growth is accountable for increased construction sites and to encroach forests by cutting trees causing over exploitation of resources.
- Exorbitant growth of industrialization has encouraged migration of local people from villages to city.
- Changing lifestyle creates pressure on basic necessities
- Due to lack of knowledge and awareness there is spread of contagious diseases
- Increased conduction of cultural and social programs increased the demand for various electrical instruments and lighting for decorations etc, causing air and noise pollution.
- Ever increasing growth of private vehicles is responsible for traffic jam and air & noise pollution.
- Non compliance of rules and regulation in social life creates stress on social environment.
- Lack of sanitation services is liable to create health problems.

S - STATUS

5.1 Social Environment:

A) Population :

Data innovation and industrial sectors require extra labors and so a sizable number of outside employees, other than selected for this reason. Therefore, there is an expanded ascent of population in Nashik city. Population is a key parameter in any sort of city arrangement.

B) Population Projection:

During the two decades (1981-2001), prior to the last one, the decadal growth rate in populations has been around 50%. Subsequently, the addition of new areas showed a downward trend; however, this would still be on the higher side for the next three decades. Accordingly, the population reached to 14.86 lakh in 2011 and estimated to be 22.38 lakhs in 2021 and over 33 lakhs in 2031 **(Table 5.1 and 5.3)**.



Table 5.1 Population forecast in NMC area till 2031

Census Year	Total Population	Decadal change	Growth rate
2021	22,38,739	7,52,686	50.65%
2031	33,72,660	11,33,921	50.65%

Population forecasting is done by using Geometric progression method

Table 5.2 Literacy rate in NMC area

Details	2011	%
Total Literate Population	11, 78,446	100%
Literate Male	6, 43,543	43.31%
Literate Female	5,34,903	35.99%

Source: Literacy Book 2011

Table 5.3 Overview of Population in City (2011)

	2011	%
Population	16,60,529	100
Child population	1,74,476	10.50
Male	7,82,517	47.12
Female	7,03,536	42.36

Source: Census Book 2011

Female Male Ratio

Female Ratio of Population by Population

Population Ratio	899
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Source: According to the 2011 census

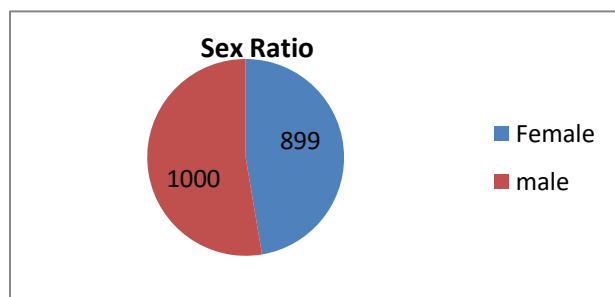


Fig 5.1 Male Female population ratio



C) Educational Facility

School Attendance is one of the pointers of DPSIR, with a goal to improve access to consummation of essential and optional training. For this, information required is understudies from ages 12-15 who go to government funded schools versus the complete number of students from ages 12-15 that are required to visit. Instruction is the indispensable factor for the general progression of any city that has advantageous result on it and gives openings for work to nationals. Diverse plans are in errand inside the city through Municipal Corporation under Sarva Shiksha Abhiyan. The fundamental guidance is imperative and it is a focal human right that has for quite a while been seen by the all inclusive group. The city has a wide scope of enlightening establishments like Medical colleges, Engineering colleges, Diploma colleges, Agricultural Institute, Science, Commerce and Arts schools, Junior schools, Middle and Primary schools, High Schools, Kindergarten, etc. Besides this, private Institutes are providing software, hardware and other information of technology to the native residents.

Table 5.4 Number of Primary Schools of Nashik Municipal School

	Year	Marathi	Hindi	English	Urdu	Total
No .of School	2014-15	110	4	4	13	131
	2015-16	110	4	4	13	131
	2016-17	110	4	4	13	131
	2017-18	110	4	4	13	131
	2018-19	110	4	4	13	131
	2019-20	74	4	3	11	92
No .of Student	2014-15	15408	1419	118	1834	18779
	2015-16	13509	1327	86	1540	16462
	2016-17	12749	1378	84	1494	15705
	2017-18	12176	1342	73	1499	15090
	2018-19	23811	1305	340	2744	28200
	2019-20	25416	1178	169	1742	28505
Number of Teacher	2014-15	401	32	5	42	480
	2015-16	400	32	3	35	470
	2016-17	386	33	3	42	464
	2017-18	387	33	3	37	460
	2018-19	806	41	0	94	941



	2019-20	785	40	0	67	892
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Source: Primary Education Department, Nashik Municipal Corporation

Table 5.5 Primary School Language Statistics

Educational Facility	Marathi	Urdu	Hindi	Gujrati	English	Total
Granted School	73	05	02	01	0	81
Non- Granted School	29	02	0	0	0	31
Permentantly Non-Granted School	0	0	0	0	128	128
Total	102	07	02	01	128	240

Source - Primary Education Department Nashik Municipal Corporation

Table 5.6 Secondary School Annualized Statistics

Regional Office	No.of School				No.of Total Student	
	Marathi	Hindi	English	Urdu	Boys	Girls
(2016-2017)						
	11	0	0	2	1988	1657
(2017-2018)						
	11	0	0	2	1751	1632
(2018-2019)						
	11	0	0	2	1366	1502
(2019-2020)						
	11	0	0	2	1504	1646

Source - Department of Primary Education, Nashik Municipal Corporation

Table 5.7 Toilet & Urinal Facilities for Primary school

Particulars	Boys			Girls		
	2017-18	2018-19	2019-2020	2017-18	2018-19	2019-2020
Primary	269	596	732	291	596	737



Table 5.8 Toilet facility for Secondary school

Sr. No.	Secondary	Girls		Boys	
		2018-19	2019-20	2018-19	2019-20
1.	WC	86	63	69	34
2.	Urinals	117	104	152	82
	Total	203	167	221	116

Table 5.9. Sports facility for Secondary school students

Sr. No.	Particulars
1	Location of sports academy in NMC
2	Facilities provided to sports academy students
3	Incentives for 10 th Std. students

In addition to this, NMC has around 400 pre-primary education centers called as 'Anganwadi' for children below age group 5 years. Primary school building in NMC area is 78 nos. NMC has constructed a number of study rooms to facilitate the students from poor community, lower and middle class group of society. Such libraries are constructed at Pandit colony, Nashik Road, Cidco office, Nehru garden, Shalimar, Panchavati and Shivaji Nagar Gangapur with library facility and computer laboratory.

Programmes undertaken by School:-

1. Cleanliness of School Premises
2. Undertaking Save Water Camps
3. Godavari Cleanliness Drive
4. E-learning Programme
5. Eco –Friendly Projects at Science Exhibition
6. Tree Plantation & Conservation



5.3 Transport Infrastructure :

Different transport modes place pressure on the environment. Public transport saves valuable space, energy and time compared to private transport and has positive health benefits. The objective of DPSIR is to improve access to public transportation for all. The number of buses per lakh population is an important indicator for the adequacy of services in the city. The CIRT norms specify 40 buses per lakh population.

Existing transport infrastructure of Nashik city is given in last year's ESR. Nashik City is the headquarter of Nashik Administrative Division which includes four regions. Nashik is at 185 kms from Mumbai and 200 kms from Pune. It is on the Golden Triangle of Maharashtra Viz. Mumbai-Pune-Nashik. The National Highway No. 03 i.e. Mumbai Agra Highway which Criss Crosses Nashik through urban areas of Nashik, and National Highway No. 50 connects Nashik to Pune. Nashik additionally has a great railroad network as it is coated on the primary line of Central Railway on Mumbai-Bhusawal Section.

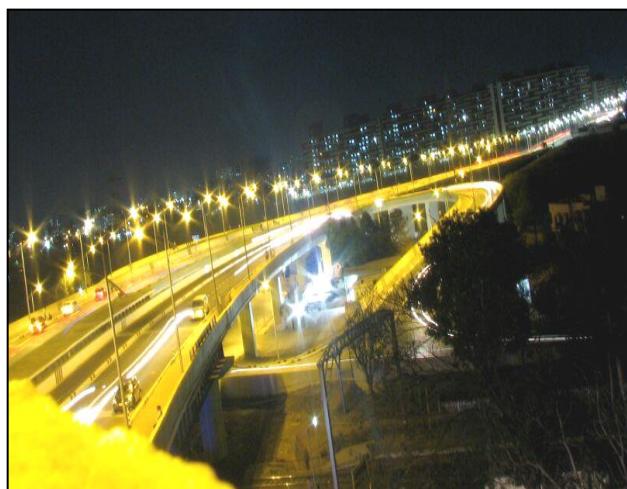




Fig 5.2 Road Transport Systems in NMC

A) The various Existing and Proposed Transport facility details are as under;

1. Highway

Nashik Dindori Wani (SH 11) Highway corridors having length of 12.50 Km, Nashik Peth (SH 12) Highway corridor having length of 14.50 Km, Nashik Aurangabad (SH 60) having length of 8Km, Nashik Trimbak (SH 4) Highway corridor having length of 10 Km, Mumbai Agra national highway no. 3 having length of 8.25 km and Nashik Pune National highway no. 50 having Highway of length 5.20 Km.

2. Flyovers

In Nashik, there is second longest Elevated Corridor in Maharashtra, the third in India. The Nashik flyover is supported on 172 columns with 12 sections each. It is comprised of 2064 portions. The Elevated Corridor in Nashik is the second of its kind in Asia and first in India. The plan of the flyover and its system quantifies it to manage overwhelming burden limit and builds its life upto 100 years. The Elevated Corridor likewise gives the city 12 path street for movement going through the city. The flyover from Mumbai Naka to Adgaon is four path, it has four path level street on both the sides and beneath it is the four path



benefit street. Four flyovers are in the Nashik Municipal Corporations farthest point and two are outside it. There are 8 underpass underneath these flyovers that will encourage city development.



Fig 5.3 Nashik flyover

Table 5.10. Details of Road systems in NMC

Sr. no.	Particulars	List of routes (starting point and ending point)	Length in Km	New Proposal
1.	Highway	1. Mumbai Agra NH-3	10.38	
		2. Nashik Pune Road NH 50	9.30	
		3.Peth Road	10.72	
2.	Flyover	1. Mumbai- Agra highway fly over	4.70	
		Bytco Chauk fly over	1.70	
3	Bridge	Gangapur bridge	0.125	Construction of bridge on Nandini river from ITI signal to Khutvad Nagar Road
		Anandvalli old bridge at east	0.12	-
		Anandvalli new bridge at west	0.12	-
		Bridge on Godavari river near	0.08	-



	Asaram Ashram		
	Bridge on Godavari river near government nusery	0.08	
	Old Bridge on Godavari river near Indraprasth Mangal Karyalay at east	0.12	
	New Bridge on Godavari river near Indraprasth Mangal Karyalay at west	0.12	
	Bridge on Godavari river near Ramwadi	0.12	
	Victoria (Holkar) Bridge on Godavari river	0.12	
	Bridge on Godavari river parallel to Victoria (Holkar) Bridge at west	0.12	
	Ramsetu bridge	0.06	
	Gadage Maharaj bridge	0.16	
	Amardham bridge	0.09	
	Bridge on Godavari river Near Lakshminarayan Mandir at Tapovan	0.24	
	Godavari Nandini Sangam bridge	0.12	
	Aagartakali bridge near STP	0.12	
	Nandur Manur old bridge at east	0.12	
	Nandur Manur new bridge at west	0.12	
	Pimpalgaon Bahula bridge on Nasardi river	0.06	
	Ambad link road old bridge on Nasardi river	0.06	
	Ambad link road new bridge on	0.06	



	Nandini river	
	Dadoba pharashi bridge on Nandini river at Satpur	0.04
	Bridge near ITI on Nandini river	0.04
	Untwadi old Bridge on Nandini river	0.04
	Untwadi old Bridge on Nandini river	0.04
	Untwadi Bridge on Nandini river on DP road	0.04
	Milind nagar Bridge on Nandini river	0.04
	Mumbai naka Bridge at east on Nandini river	0.04
	Mumbai naka Bridge at west on Nandini river	0.04
	Wadala road Bridge on Nandini river	0.04
	Pakhhal road Bridge on Nandini river	0.04
	Neara Denadeep society vaidyanagar Bridge on Nandini river	0.03
	Kathegalli tapovan link road new Bridge at east on Nandini river	0.04
	Kathegalli tapovan link road old Bridge at west on Nandini river	0.04
	Bridge near Takali village on Nandini river	0.04
	Bridges at S. no. 163 & 221 on	0.04



	Waghadi river	
	Bridge at talathi colony on Waghadi river	0.04
	Bridge behind Bhikusa paper mill on waghadi river	0.04
	Bridge on old Agra road on Waghadi river	0.04
	Bridge at Lakshmi Jhula on Waghadi river	0.03
	Ganeshwadi Bridge on Waghadi river	0.03
	Dadhegaon bridge on Waldevi river	0.04
	Bridge at Pimpalgaon khamb on Waldevi river	0.05
	Bridge at Wadner dumala on Waldevi river	0.0
	Old Bridge at west side at devalali gaon on Waldevi river	0.08
	New Bridge at east side at devalali gaon on Waldevi river	0.08
	Bridge at Rokadoba wadi on DP road on Waldevi river	0.08
	Bridge at Bagul nagar on Waldevi river	0.08
	Bridge on lendi nalla	0.25



5.4 City Bus Service In NMC Area

Public transport is any form of transport that can carry many people at a time along pre-specified routes following pre-published schedule. Since public transport carries many people in one vehicle, the pollution, resource consumption and accident rates are much lesser than individual private vehicles.

The State city Bus operates about 143 buses on 508 routes. There is one bus depot at Panchavati in Nashik area. Total breakdown of buses per day are 120 nos/day. Considering insufficient public transport provision, a number of major manufacturing companies have provisions to provide commuter bus services for the sole use of their employees, thereby guaranteeing their employees to reach destinations on time. Statistical details of Nashik municipal transport system is presented in **Table 5.11**



Fig 5.4 Nashik Bus Stand



Table 5.11. Statistical details of Nashik Municipal Transport System

Sr. no.	Particulars	2015-16	2016-17	2019-20
1.	Own buses (average per day)	183	182	120
2	Passenger travelling in a year (ticket sale + passes)	417	438	450
3	Number of buses using diesel as fuel	183	182	143
4	Diesel consumed (liters) per day	11500	11500	9190
5	Number of buses using CNG as fuel	0	0	0
7	Fuel saving due to use of different fuel alternatives	0	0	0
8	No. of passengers using public transport	417	438	450

Source: MSRTC Nashik Bus Depot.

Table 5.12. Details of the city buses

Sr. no.	Particulars	2014-15	2015-16	2016-17	2017-18	2018-19	2019-20
1.	No. of buses	196	195	194	194	158	143
2.	No. of routes	508	508	508	508	508	508
3.	No. of proposed routes	-	-	-	-	-	-
4.	Length of proposed routes	-	-	-	-	-	-
5.	No. of proposed buses	-	-	-	-	-	-



Source: MSRTC Nashik Bus Depot

Table 5.13 Yearly basis Buses Numbers

S. No.	Years	2014-2015	2015-2016	2016-17	2017-18	2018-19	2019-20
1	1-5	131	127	102	102	98	0
2	6-10	62	60	75	75	60	140
3	11-12	3	8	17	17	0	3
4	More than 12 years	0	0	0	0	0	0
	Total Buses	196	195	194	194	158	143

Source: MSRTC Nashik Bus Depot

Table 5.14 Distribution of Buses from fuel type

	Type of fuel	2014-2015 number of buses	2015-2016 number of buses	2016-17 No. of buses	2017-18 No. of buses	2018-19 No. of buses	2019-20 No. of buses
Nashik city buses	Diesel	196	195	194	194	158	143
	CNG	0	0	0	0	0	0
On Rent basis	Diesel	0	0	0	0	0	0
	CNG	0	0	0	0	0	0

Source: MSRTC Nashik Bus Depot

B-6. Private Transportation

Urbanization, population growth and insufficient number of government vehicles lead to increased load on transportation, primarily usage of private vehicles is magnified. Vehicles which were registered in 2019 and 2020 is as follows.

Table 5.15 Officewise & Category wise No. of vehicles as on 31/03/2020 in NMC area



Category	M.V. Population as on 31/3/2019	No. of vehicles New Registration & RMA (1/4/2019 to 31/3/2020)	Incoming vehicles (1/4/2019 to 31/3/2020)	Outgoing vehicles (1/4/2019 to 31/3/2020)	Cancellation of registration/ scraped etc. (1/4/2019 to 31/3/2020)	Motor vehicle as on 31/3/2020
Two wheelers	1237692	73647	0	0	0	1311339
Cars	192180	13083	0	0	0	205263
Jeeps	26380	0	0	0	0	26380
Station wagons	96	0	0	0	0	96
Meter fitted	2095	89	0	0	3	2181
Tourist cabs	4401	3071	0	0	0	7472
Auto rickshaws	23630	8	0	0	22	23616
Stage carriages	950	46	0	0	0	996
Cont. carriage mini	1541	587	0	0	0	2128
School buses	1869	2	0	0	5	1866
Pvt. Service vehicles	209	23	0	0	0	232
Ambulance	691	20	0	0	0	711
Arti. & Multi. Veh.	70	5001	0	0	0	5071
Trucks & Lorries	23846	149	0	0	4	23991
Tankers	965	0	0	0	0	965
Delivery van	30732	309	0	0	10	31031



(4 wheeler)						
Delivery van (3 wheeler)	14642	0	0	0	0	14642
Tractors	79056	3579	0	0	0	82635
Trailers	29489	453	0	0	0	29942
Others	6442	315	0	0	0	6757
Total	1676976	100542	0	0	44	1777474

Source: R.T.O, Nashik

B-7. Road Accidents

The information from Nashik Police Commissioner towards accidents in 2019-2020 for the broad area covering NMC, Cantonment boards and suburban areas is presented in the table given below.

Table 5.16 Road Accidents Registered in NMC area

Sr. No.	Accidental cases (Year wise)	No. of registered cases
1	2014-15	243
2	2015-16	313
3	2016-17	248
4	2017-18	254
5	2018-19	260
6	2019-20	274

Source: Nashik Municipal Corporation

B-8. Airport facility :

There is no airplane terminal for regular citizens inside Nashik Municipal Limits. The closest one is at Ozar Airplane terminal (household military) which is situated around 24 km from the downtown area. It is Operated by Hindustan Aeronotics Limited. In spite of the fact that the freight terminal was propelled in year 2011, the development of traveler terminal complex is finished and it is relied upon to begin activities soon. There is military air terminal at Gandhi



Nagar (Nashik city). The close-by air terminal is at Mumbai (worldwide) 190 kms., and another at Aurangabad (residential) at around 218 kms from the city. Flight administrations are in routine.



Fig 5.5 Map depicting location of the Nashik Airport



Fig 5.6 Airport facility at Nashik



Fig 5.6 Airport facility at Nashik



5.6 Details of Property Tax

Information of Nashik Municipal Corporation Property Tax details are given in following table:-

Table 5.17 Details of Total Property Tax Collection

Nashik Municipal Corporation, Nashik											
Tax Department											
Property Tax Target & Recovery Status 2017- 18											
Division	No. of Prop	Target			Recovery (Rs.)		Advance payment	Total Recovery	Recovery (%)		
		Arrears	Current	Total	Arrears	Current			Arrears	Current	Total
Satpur	47634	122146966	85002081	207149047	29245630	62397515	256716	91899861	24%	73%	44%
Nasik West	38495	221787853	159313877	381101730	80894580	125899122	12934368	208087138	36%	79%	54%
Nasik East	78715	385233084	147223974	532457058	57809645	96867235	3186852	157863732	15%	66%	29%
Panchavati	91577	375101877	129058155	504160032	59109193	80819914	619419	140548526	16%	63%	28%
New Nasik	97517	226676877	155401296	382078146	66986108	112388414	867536	180242058	30%	72%	47%



Nasik Road	72366	265623492	144100040	409723532	50233475	97595186	1298013	149126674	19%	68%	36%
Grand Total	426304	1596570149	820099423	2416669545	344278631	575967386	7521972	927767989	21.56%	70.23%	38.39%

Nashik Municipal Corporation, Nashik											
Tax Department											
Property Tax Target & Recovery Status 2016- 17											
Division	No. of Prop	Target			Recovery (Rs.)		Advance payment	Total Recovery	Recovery (%)		
		Arrears	Current	Total	Arrears	Current			Arrears	Current	Total
Satpur	46874	106981394	82506939	189488333	25843652	60362751	324686	86537089	24.16%	73.16%	45.67%
Nasik West	38273	210962978	157892054	368855032	45068328	112253339	1444754	158766421	21.36%	71.09%	43.04%
Nasik East	78037	343818811	146235276	490054087	54618992	95054053	3555044	153228089	15.89%	65.00%	31.27%
Panchavati	89490	344942960	125794854	470737814	59676141	78071425	342622	138090188	17.30%	62.06%	29.33%
New	96761	212131951	15394421	366076162	60467657	10791842	789582	16917566	28.50%	70.10%	46.21%



Nasik			1			7		6			%
Nasik Road	71736	263672046	14344836	407120411	54408724	95699706	1733397	15184182	20.63%	66.71%	37.30%
Grand Total	421171	1482510140	809821699	2292331839	300083494	549359701	8190085	857639274	20.24%	67.84%	37.41%

Nashik Municipal Corporation, Nashik											
Tax Department											
Property Tax Target & Recovery Status As on 20/03/2018											
Division	No. of Prop	Target			Recovery (Rs.)		Advance Payment	Total Recovery	Recovery (%)		
		Arrears	Current	Total	Arrears	Current			Arrears	Current	Total
Satpur	47861	147582038	117174748	264756786	32506384	84018393	265846	116790623	22%	72%	44%
Nasik West	38792	187856914	220277609	408134523	38857670	16717056	934981	206963213	21%	76%	50%
Nasik East	78943	474044191	207999337	682043528	66768884	12670138	2824512	196294784	14%	61%	28%
Panchvati	92124	457147690	184436470	641584160	52203105	10475295	263179	157219235	11%	57%	24%



New Nasik	97894	248346562	215611902	463958464	60605737	148757337	508553	209871627	24%	69%	45%
Nasik Road	72802	319305831	204215189	523521020	53606942	131445238	509390	185561570	17%	64%	35%
Grand Total	428416	1834283226	1149715255	2983998481	304548722	762845869	5306461	1072701052	16.60%	66.35%	35.95%

Nashik Municipal Corporation, Nashik

Tax Department

Property Count 2017-2018

Division	Resi.		Comm.		Resi + Comm		Ind		MTS	Educational	Charetable Trust	State Govt. Prop.	Central Govt. Prop.	Open Plot	Demolish.	Total
	Auth	Unauth	Auth	Unauth	Auth	Unauth	Auth	Unauth								
Satpur	35849	3336	2315	412	615	156	1685	136	349	19	6	17	2	2040	697	47634
Nasik West	25808	446	8017	581	588	11			661	128	5	155	5	461	1629	38495
Nasik	55207	2469	13016	496	2238	42			209	47	1	59	21	1802	3108	78715



East																
Panchvati	67505	3719	7807	534	1832	77			202	83	3	219	1	7592	2003	91577
New Nasik	76998	2588	7209	463	2715	83	1737	215	31	45		23	7	4121	1282	97517
Nasik Road	51255	4848	9132	547	543	79			163	101		64	3	1498	4133	72366
Grand Total	312622	17406	47496	3033	8531	448	3422	351	1615	423	15	537	39	17514	12852	426304

Nashik Municipal Corporation, Nashik

Tax Department

Property Count 2016-2017

Division	Resi.		Comm.		Resi + Comm		Ind		MTS	Educational	Charetable Trust	State Govt. Prop.	Central Govt. Prop.	Open Plot	Demolish.	Total
	Auth	Unauth	Auth	Unauth	Auth	Unauth	Auth	Unauth								
Satpur	35685	3286	3811	544	615	145			349	19	5	17	2	1717	679	46874



Nasik West	25920	431	7965	543	589	10			661	114	5	155	5	396	1479	38273
Nasik East	55067	2279	12962	458	2235	38			209	47	1	61	21	1576	3083	78037
Panchvati	66487	3528	7777	507	1829	73			202	83	3	219	1	6826	1955	89490
New Nasik	76745	2541	8884	714	2706	85			31	45		156	7	3603	1237	96754
Nasik Road	51000	4846	9101	534	541	73			163	101		66	3	1315	3992	71735
Grand Total	310904	16911	50500	3300	8515	424	0	0	1615	409	14	674	39	15433	12425	421163

Nashik Municipal Corporation, Nashik																
Tax Department																
Property Count As on 20/ 03/ 2018																
Division	Rsei.		Comm.		Resi + Comm		Ind.		MT S	Educational	Charetable Trust	State Govt.	Central Govt. Prop	Open Plot	Demolish	Total
	Auth.	Unauth.	Auth	Unauth	Auth	Unauth	Auth	Unauth								



												Pro p.				
Satpur	3585 7	3336	231 6	412	616	156	168 2	136	349	19	6	17	2	224 6	711	4786 1
Nasik West	2582 1	457	811 9	583	579	11			661	125	5	155	5	485	1786	3879 2
Nasik East	5520 2	2478	130 32	502	222 7	43			209	47	1	59	21	194 4	3177	7894 2
Pancha vati	6755 1	3723	781 2	533	182 9	77			202	83	3	219	1	804 9	2042	9212 4
New Nasik	7702 0	2599	721 8	457	271 2	83	173 5	214	31	45		11	8	444 1	1319	9789 3
Nasik Road	5160 0	4835	915 5	549	538	79			163	101		64	3	153 3	4182	7280 2
Grand Total	3130 51	17428	476 52	3036	850 1	449	341 7	350	161 5	420	15	525	40	186 98	13217	4284 14



5.6 Building Permission Department

It is important to obtain the data about the present housing stock, its proprietorship, sort of development, state of structures, kinds of houses, and so forth. The figures of the year 2014, with the NMC demonstrate that, there are around 3,25,235 existing houses in the city. The majority of the old houses in old city have stone foundations with block or mud dividers and tiled rooftops. The present day houses being developed in the periphery of the city are for the most part of RCC developments with precast blocks. The vast majority of the houses in old gaothans (Core city) of Nashik, Panchvati, Deolali, Satpur are old and are in a poor condition. The table underneath demonstrates dissemination of number of houses by age and year.

(Source : Nashik Development Plan 2016-36).

Table 5.18 Distribution of houses by age

Distribution of houses by age (years)							
Sr. no.	Divisions	Above 60	40-60	15-40	Below 15	Temporary	Total
1	Nashik road	466	2440	11474	21820	-	36200
2	Panchavati	6679	6650	20621	42188	-	76138
3	Nashik east	14642	12553	14073	30067	1881	73216
4	Nashik west	613	1318	4026	3767	448	10172
5	Satpur	76	4575	11642	20358	890	38229
6	CIDCO	1938	1435	41448	44821	1638	91280
	Total	25102	28971	103284	163021	4857	325235

Source : Nashik Development Plan 2016-36

From 2015 to 2018 total 8692 construction projects are proposed among that total 5621 projects got permission. Total 5239 projects applied for the completion certificate out of which total 2944 projects got completion certificate.



Table 5.19 Table showing details of Building Permission

Sr. No.	Particulars	2015-16	2016-17	2017-18	Total
Details of building construction					
1.	Proposed projects	3145	3148	2399	9292
2.	Projects got permission	1527	2170	1924	5621
Details of project completion certificate					
3	Projects applied	1266	582	3391	5239
4	Projects got permission	700	225	2019	2944

Source- Town planning Department, NMC

Table 5.20 Showing details of Building Permission & completion certificate in 2018-19

1.	Proposed projects	1877
2.	Projects got permission	1340

Source- Town planning Department, NMC

Table 5.21 Online Approved Occupancy Permission (Period 1st April to 31st March)

Sr. No.	Particulars	2017-18	2018-19
Details of building construction			
1.	Proposed projects	888	4021
2.	Projects got permission	371	1406
Details of project completion certificate			
3	Projects applied	09	50
4	Projects got permission	04	09

Source- <https://nmcobpas.in/> web Portal Town planning Department, NMC



5.7 Slum Development in NMC

The general population lives in slums and there is shortage of good housing facilities, water supply, sanitation, and deficiency of basic necessities influence soundness of tenants including kids and ladies. Because of quick development of populace in NMC region, 167 nos. of slums in various areas were developed till 2016, of which 57 were declared as slums colonies, while remaining 110 were not declared. Add up to population in slums area is evaluated as 1,99,506. Particulars of slum in NMC region are given in Table 5.22.

Table 5.22 Details of Slum in NMC area

Sr. No	Detail	2017-18	2018-19	2019-20
1	Number of slum	167	159	159
2	Slum Population	1,99,506	1,96,005	1,92,959
3	The number of declared slum colonies	57	47	55
4	The number of undeclared slum colonies	110	101	104
5	Population in the slum compared to the total population	11.76	14.7265	12.98

Source: Slum Rehabilitation Department, Nashik Municipal Corporation

5.7 Slum Rehabilitation Plan

The housing development is along the periphery of the town as well as along the activity nodes. As per 2011 census, there are 300000+ houses existing in Nashik. Most of the structures in Gaothan and congested area of Nashik are old. These slums are located in the core area. The housing conditions in these slums are poor.

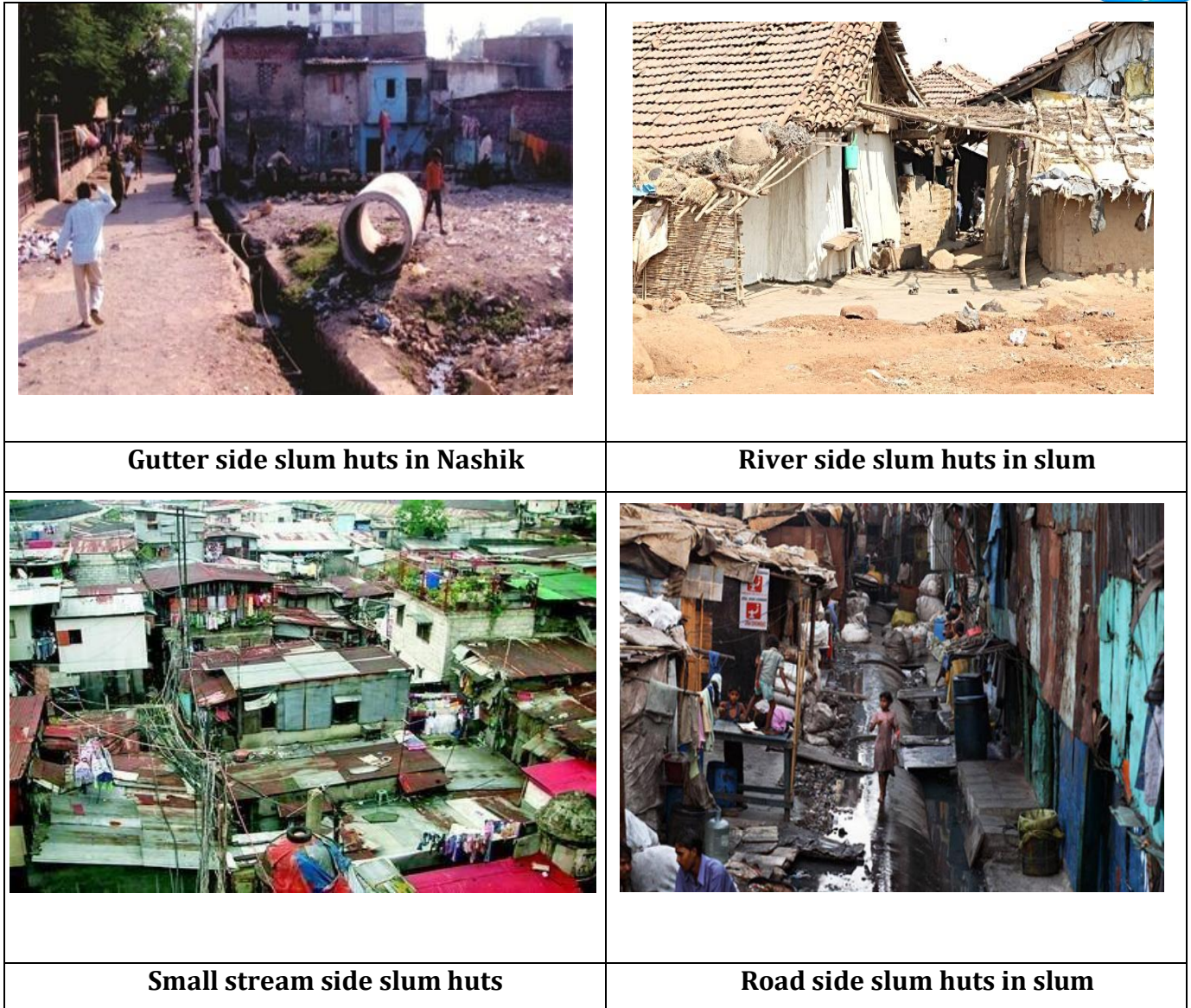


Fig 5.7 Different Location Of Slum Huts In Nashik Municipal Urban Area.

5.10 Heritage of NMC

Nashik was known as the place of learning and meditation in the days of Ramayana sacred pilgrimage groups now re-created it with new identity on the map of India. It is now known as the city developing agriculturally and industrially. The city is situated on Mumbai-Pune-Nashik golden triangle. Nashik city is fourth largest populated city of Maharashtra, and is famous for its wineries and industries.



A) Tourism

In order to improve the environment and biodiversity, NMC has developed 481 gardens on 1078394 hectare land and also built scenic green belt on road dividers, following norms of Tourism department.

Garden department has developed gardens in following zones:

- Nashik West 71 gardens on 209933 hector
- Nashik East 72 gardens on 135463 hector
- Nashik Road 122 gardens on 174259 hector
- New Nashik 71 gardens on 131988 hector
- Satpur 41 gardens on 176838 hector
- Panchavati 104 gardens on 24913 hector

B) Tourism Development plan

Due to tremendous development in Nashik city during last few years, construction activities are observed in most of the part of the city. Special attention has been given towards protection of natural resources in hills, forests etc. and rejuvenation of banks of rivers, nallahs etc. within the city.



Tapovan



Kailas Math/ Bhaktidham

Fig 5.8 Major Religious Places in Nashik City

Tapovan

Tapovana or the Forest of Austerities is located hardly 1.5 km on the downstream of Panchwati on Godavari River. Once a part of the holy Dandakaranya forest, Tapovan is a pictorial spot and has a close association with the epic Ramayana. Lord Ram who is believed to



have lived on fruits collected by Lakshmana from this forest. Besieged in the richness of lush greenery, Tapovan presents a tranquil ambience. At this place, Lakshmana cut the nose of Shurpanakha, the sister of Ravana. Therefore the city got its name Nashik. This sacred place has temples of Ram Laxmana. At the time of Sinhastha Kumbhamela, majority of Sadhus camp at Tapovan.

Kailas Math/ Bhaktidham

It is located in Panchwati area near Pethnaka. It Is also called as Bhaktidham. It has temples of various deities. Kailas Math is a old religious ashram where Vedas are being taught. Established in the year 1920 by H.H.Swami Hridayanand Maharaj. The institution was headed by renowned Acharyas. Month long religious celebrations are held during month of Shravana.



Shree Kalaram Mandir



Panchavati

Fig 5.9 Major Religious Places in Nashik City:

Shree Kalaram Mandir

Kalaram Mandir is situated within the Panchvati area of Nashik City. This temple is situated at a distance of 3 km from Central Bus stand. City buses and auto rickshaws are available from various corners of the city to reach the temple. This temple is supposed to stand on the spot where Lord Ram lived during his exile. It was built in 1782 by Sardar Rangrao Odhekar on the site of an old wooden temple. The temple has standing images of Lord Rama, Sita, Laxmana which are of black stone, and around 2 feet height. The Ramnavami festival is celebrated in Chaitra (March-April).



Panchvati

Panchavati is situated on the left banks of sacred river Godavari in Nashik city. Close to Kalaram temple there are some very old and lofty banyan trees which are believed to sprung from five banyans which gave its name to Panchvati. The name 'Panchvati' is derived from the words Panch which means five and Vati which means banyan tree. This is the site where Sita Gumpha or Sita's Cave is situated. Kalaram temple, Kapaleshwar temple, Ganga Godavari temple, Sunder Narayan temple, Talkuteshwar temple, Nilkantheshwar Goraram mandir, Murlidhar Mandir, Tilbhandeshwar mandir, Balaji temple, Sandvyachi devi temple, Vitthal temple, Pataleshwar temple, Naroshankar temple, Ramkund, Karthikswami temple, Dutondya maruti, Katya marcuti temple, Panchmukhi Hanuman temple, Bhadrakali temple, Katpurthala monuments are located in and around Panchavati area. Nashik has earned name of the Banaras of western India due to large number of temples.



Fig 5.10. Seeta Gumpha

Seeta Gumpha

Sita gupha is situated in Panchawati area about 3 km away from the Nashik Central bus stand. It is said that Seeta stayed in this caves for some days during exile (Vanvas). The deities of Ram, Seeta and Laxman are placed inside the first main gummpha. In the second small gupha there is a Shivling. The main reason attributed for the Shivling is that Seeta used to worship God Shiva and she never took her meals before worshipping him. So for her convenience Shivling was placed in that gupha. It was in this cave that Lord Rama used to hide Sita when he had to leave her, and it was from here that Sita was carried by Ravana disguised as a begger.



Fig 5.11. (a)Ganga Godavri Temple



(b)Ramkund

Ganga Godavari Temple

This temple is adjacent to Ramkund. It was built in 1775 by Gopikabai Peshwe. Statue of Godavari and Bhagirath are placed inside the temple. The temple remains closed for 11 years, but opens on the day of Kartik Poornima (full moonlight) once in 12 years and kept open for a year in Simhastha period.

Ramkund Nashik

Ramkund is located along the bank of Godavari River. This place is situated at a distance of 2 km from Central Bus stand. This is the holiest spot in Nashik as it is believed to be the place where Lord Rama used to bathe. It contains the bone dissolving Asthivilaya Tirth. It was built by Chitrarao Khatav, a landholder of Khatav in Satara in 1696 and was repaired by Gopikabai, the mother of Madhavrao the fourth Peshva. People bring ashes of their deceased relatives and immerse it in Asthivilay kund. Ashes of big personalities like Pandit Nehru, Indira Gandhi, Y B Chavan and others had been immersed at Ramkund.

Kapaleshwar Temple Nashik

Kapaleshwar is among the very oldest temple in Nashik city located near Ramkunda, Panchavati. It is about 2 KM from CBS towards North-East. This Temple was renovated by



"Peshwas". The story behind it is that lord Shiva by mistake killed a cow ("GOHATYA"). To clean his sin, the Nandi told him to go to NASHIK and take a bath in Ramkund. As per Nandi's instruction, Lord Shiva came at NASHIK and cleaned his sin by taking a bath in RAMKUND. And after that he did some JAP, the place where now the Temple is located. You can also observe that this particular Shiva temple don't have any NANDI because NANDI suggested to Lord Shiva about the taking bath in RAMKUND for cleaning his sin, and because of this Lord Shiva adopted Nandiji as his Guru. At every Monday and at PRADOSH 6.30 PM, there is a Pooja at RAMKUNDA GANGA GHAT of Shree Kapaleshwar Mandir. Many people come for Darshan in this Mandir daily. Many people arrange Shree Satyanarayan Pooja in the month of Shravana here. Some people make 101 pradakshina to this mandir to complete their wishes. 57 There are also Shree Ganesh Mandir, Maruti Mandir, Gayatri Devi Mandir near Kapaleshwar Mandir.



Kapaleshwar Temple

Fig 5.12 Kapaleshwar Temple

Summary

Review of Environmental & Socio-economic status -

To prepare environmental status report collected by primary and secondary information from economic, industrial development corporation and government offices of Nashik municipal corporation.

The aim to create a report that ensure sustainable environmental conditions, sound economic and social life. Social changes create stress on environmental elements and population growth.



Educational facilities, electrical vehicles, highways, bridges, private vehicles, slum eradication and rehabilitation, tourism temple, all those factors are directly or indirectly affect our environment. The quality of life is influenced by following indicators as follows: employment generation, work state, home, food, clothing, drinking water, sanitation, health, quality, energy, communication, transportation, education, environmental pollution, entertainment, increase in social security and human rights, industrial growth, vehicular use. Nashik is a big industrial township. Due to growing industrialization and vehicular usage results in increased air, noise and water pollution.

R – Response

- 1) To conduct the activities for awareness and cleanliness of the city.
- 2) Various activities organized for environmental conservation and protection.
- 3) Organization of various educational environmental programs in schools.
- 4) Green cities initiatives for NGO's with the help of CSR extermination of carry bags and plantation of trees.

Proposed measures

- 1) Arrangement of periodic programs on environmental development.
- 2) Building of the private toilets by government as an initiative to keep the city clean.
- 3) Latest community toilets/public toilets are being repaired and improvement programs also started.
- 4) In slum area, provision for sewer network.

Initiatives taken by Nashik Municipal Corporation

1. 'Rent-a-cycle' scheme under the smart city mission:- Mayor Ranjana Bhansi and civic chief Tukaram Mundhe jointly.

Currently, over 30 cycles would be available at three locations –Golf Ground, Mahatma Nagar Cricket Ground and Rajiv Gandhi Bhavan. In the next Couple of Days the NMC would start similar facilities at seven more locations –Marathon Point, Kusumagraj library, Gokul



Pingale library, Pramod Mahajan garden, KTHM College, Veterinary hospital and Jehan circle.

The Civic Body would extend the scheme to 90 more locations in future. NMC has plans to create cycle tracks wherever possible. The bicycles are fitted with GPS that would enable authorities to track movement from Control Room. The person hiring the cycle will have to return it to the nearest docking station.



Chapter 6

Electricity Generation and Energy Saving

6.0 Introduction



Presently Maharashtra State Electricity Distribution Co. Ltd. (MSEDCL) supplies electricity for regular use in NMC area (Table 6.1). Comparatively, use of wind and solar energy is negligible. Similarly use of CNG in vehicles is less as compared to petrol and diesel. Eklahare Thermal Power Plant located in village Eklahare, near Nashik Road, caters to the power demand in the western division grid which is subsequently distributed to substations and finally to households.

Table 6.1 - Power consumption (MW) in previous years

Years	2009-10	2010-11	2011-12	2012-13	2013-14
No. of consumers	158900	163980	209120	258980	310443
Power in Residential (MW)	140	157	179	209	228
Power in heavy industries (MW)	220	245	271	298	327
Power in light Industries (MW)	26	29	33	39	47
Power in Commercial (MW)	35	39	44	51	60
Power in Other (MW)	18	20	24	31	41
Total load	439	490	551	622	703
Load Growth (KW)	10.6	11.6	12.44	12.88	13.02

Source: - MSEDCL

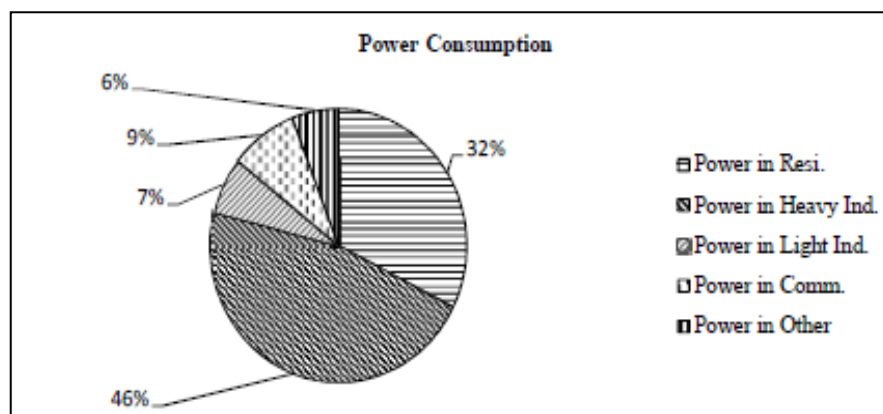


Fig 6.1- Consumption of power in different sectors

From above fig 6.1, it is seen that power consumption in heavy industries has increased considerably.

D-Driving Force

1. Increase in population
2. Increase in no of high energy consuming equipments & machineries due to high standard of living
3. Modern lifestyle

P-Pressure

Use of model equipments (E.g.-AC, Dish Washer, Heater), increases use of energy which results in loss of natural resources.

S-Status



6.1 Energy

It is observed that, every year there is increasing demand of electricity. Maximum usage of electricity is in Residential area. Consumption of electricity in Nashik area is presented in Tables 6.2.

Table 6.2 - Sector -wise Electricity Consumption Source- MSEDCL, Nashik

Month	Nashik East	Nashik West	Satpur	New Nashik	Nashik Road	Panchavati	Total Rupees.
Apr -19	4178630	2687450	3687010	6291620	4368630	5988640	27201980
May -19	3572750	2334730	3742430	6028880	4377010	5099556	25155356
Jun - 19	3538280	2502980	3509220	5960275	3982820	5274230	24767805
Jul - 19	3318320	2202940	3547380	6097950	3786880	5371660	24325130
Aug - 19	3394830	2362609	3507220	5715940	3780051	4862670	23623320
Sep -19	3348960	2211350	3498580	5861110	3800730	5180700	23901430
Oct -19	3412210	2385140	3434100	5814290	3890950	5347190	24283880
Nov -19	4128900	2861360	3597093	6726350	4096080	5495550	26905333
Dec -19	3494240	2955480	3921630	7127710	5456650	5812430	28768140
Jan -20	3409787	2907880	3893500	6758290	3913290	6042570	26925317
Feb - 20	3518850	2843950	4067670	6341760	4638340	5537070	26947640
Mar -20	3574160	2568715	3865760	6247652	4497260	5455660	26209207
Total Rupees	42889917	30824584	44271593	74971827	50588691	65467926	309014538

Source: - Electrical Department of NMC

6.2 Street lighting

Major functions of electrical Department are providing street light facility on Municipal Roads, Gardens, Public Places, and Jogging track. Street light department is decentralized in 6 divisions for maintenance purpose (Table 6.3 and 6.4). There are 87251 no. of poles in Nashik NMC has installed a number of high mast in various Chowks of city to facilitate cross over traffic during night hours.

Table 6.3 - Details of street light in 2019-20

Details of Existing Luminaire			
Sr. No.	Existing type of Lamp	Conventional Light	Number of Lamp
1	HPSV	70W	21139
2	HPSV	150W	14178
3	HPSV	250W	8786
4	HPSV	400W	1817



5	T5	96W	37
6	LED	30W	6862
7	LED	40W	7973
8	LED	45W	3522
9	LED	55W	7141
10	LED	60W	4331
11	LED	85W	7373
12	LED	90W	2976
13	LED	120W	580
14	LED	170W	55

Source: - Electrical Department of NMC

Total 87251 poles covers approx. 1974 km of road length. Average spacing between poles is 35 m. As Nashik Municipal Corporation is developing very fast, NMC has to install 3000 to 3500 poles every year in new residential areas.

Table 6.4 - Details of LED Street light

Sr. No.	Area	Total no. of LED
1	Satpur	6732
2	Panchavati	11593
3	Nashik East	6162
4	New Nashik	8574
5	Nashik West	3113
6	Nashik Road	7674

Source- Electrical Department of NMC

Taking into view regarding energy crisis in the state and at National level, NMC has taken up the project of energy saving in streets lights from the year 2003-2004. NMC has installed energy saving technique for street lights in all six divisions. Out of 1610 metering point, so far NMC have installed 650 energy saver panels. The average savings achieved by this energy saving technology is about 30%.

Nashik Municipal Corporation has been awarded the 2nd Prize in Municipal Corporation sector in the “State Level Award for Excellence in Energy Conservation and Management” for the year 2005 by Maharashtra Energy Development Agency.



Table 6.5 - Nashik Municipal Corporation Renewable Energy Projects-2019-20

Solar water heater	-
Photovoltaic system	7
Solar Traffic signals	41
Solar Blinkers	-
Solar air-conditional system	-
Bio-methanation Plant	-

As per DPSIR 'Total Energy Consumption' indicator aims to reduce overall energy consumption. By reducing the amount of electricity that we consume, we can reduce emissions of greenhouse gases and help stop global warming. Electricity consumption impacts air quality and greenhouse gas emissions.

Summary

By considering growth of the city in future, there may be stress on present power generation & energy resources. The device measures the area of electricity and energy saving solution as well as the need to raise awareness. The use of renewable energy sources is necessary for it to reduce stress.

I-Impact

1. Growing population leads to increased use of energy, resulting in declined trend in natural resources.
2. Due to increase in vehicles, there is an enormous demand for fuel that ultimately enhances air and noise pollution load.
3. Rising demand of energy and less availability of natural sources enhances the cost of energy.
4. Problems are often created towards protection, conservation, regulation, distribution, determining uniform rates and transportation etc. of natural sources (oil, diesel, petrol, coal) throughout the country.

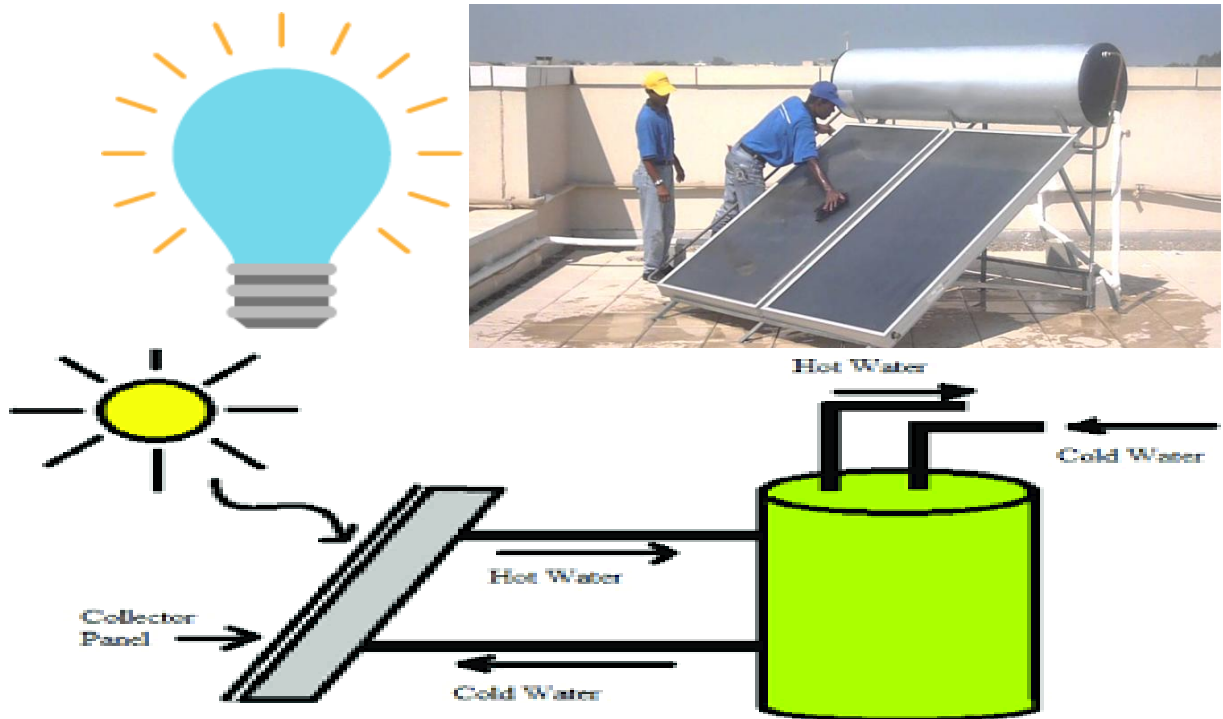


Fig 6.2 - Solar Water Heater

R-Response

- Inductor fittings are being used for energy saving method at different places in NMC area. And LED fitting is being implemented on roads and at slum areas on experimental basis.
- Energy efficient lamps are used for street lighting.
- Energy efficient T-S tube lights and Bureau of Energy Efficiency approved Fans are used in NMC buildings.
- There is a need to develop awareness towards saving of energy.
- In an over whelming response, energy is being saved in developing new projects.
- Use of solar energy has been made mandatory for giving permission to construct building of over 4000 sq. m area. Accordingly, solar heaters are in use in large residential buildings (Fig 6.2).



- Water supply and drainage pumping station energy audit done in Nashik city.
- LED fittings arranged for all street lights.



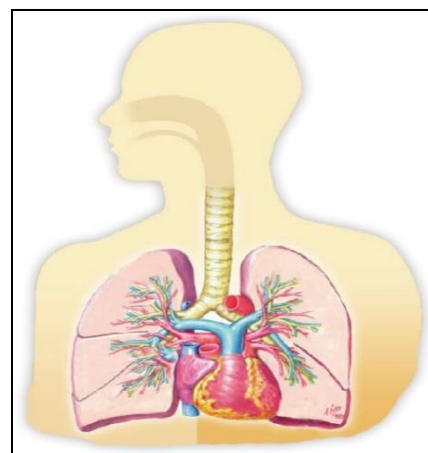
Chapter 7

Health and Environment

7.0 Introduction

The interaction between the earth and human well-being are very unpredictable and hard to survey. The best-known well-being impacts are identified with encompassing air contamination, poor water quality and deficient sanitation.

According to an examination by WHO, ecological variables are in charge of spreading over 80% of the ailments. Ailments with the biggest mortality rate include respiratory contaminations, Dengue and Malaria.



The status of health of residents is one of the most crucial indicators of the environmental status of a city. But in addition to good environmental conditions, a city also needs to have good healthcare facilities. The following section presents the status of various diseases recorded in NMC in the year 2019-20 and the actions taken in the sensitive wards in NMC area.

D – Driving Forces

1. Pollutants in surrounding Environment
2. Total Birth rate
3. Growth rate of population
4. City development rate
5. Health awareness
6. Health and cleanliness related awareness
7. Employment rate
8. Population under poverty
9. Social



P - Pressure

Frequency of Solid waste collection in residential area.

7.1 Health Care Facilities in NMC Area

Nashik Municipal Corporation has diverse health care services and facilities including Clinics, Hospitals, Super Specialty Hospitals, Private and Government dispensaries and so on. In Nashik, there are 4 municipal hospitals, 5 municipal nursing homes, 30 municipal dispensaries & primary health centers, along with 1 leprosy unit and 11 leprosy centers. All medical facility centers are equipped with necessary aid for emergency cases. It has recently introduced the service of super specialty wards at hospitals with the help of private operator. There are plenty of private hospitals and government hospitals in the city which are equipped with the latest instruments and specialist doctors. Given below is the list of current health care facilities of Nashik Municipal Corporation as in **Table 7.1**.

Table 7.1 - Public Health Department Services in Hospitals of Nashik City

Sr. No.	Name of Hospital	Total no. of Beds	Solar powered fans, lamps, etc.	Sewage treatment system present Yes/ No	Water Reuse/ Recycling	Quantity and Disposal of Biomedical waste
1	J.D.C Bytco Hospital, Nashik Road	200	Solar Water Heater Installed	No	No	M/s Water Grace Product is collecting biomedical waste from all hospitals and disposing it through incineration near Kannamwar Bridge, Dwarka, Nashik
2	Dr. Zakhir Hussain Hospital, Kathda, Nashik	100	Solar Water Heater Installed	No	No	
3	Indira Gandhi Hospital, Panchvati, Nashik	60	Solar Water Heater Installed	No	No	
4	Shri Swami Samarth Hospital, Morwadi, CIDCO, Nashik	40	Solar Water Heater Installed	No	No	

Source: Health Department, Nashik Municipal Corporation



Also, Nashik Corporation provides preventive and treatment services to the citizens. Preventive services include following:

1. Vaccination
2. Pulse Polio Program

According to the indicators given by DPSIR, health care is an important indicator and its objective is to improve health conditions. Health care indicator costs are linked to social, economic and environmental conditions in a city. Improving the health of people as well as of the environment is necessary for sustainable economic growth, and is a precondition for reducing poverty.

Table 7.2 - Health care facilities available in NMC area (2019-2020)

Sr. No	Type of Medical Establishment	Nos.
1	Total no. of beds available	8533
2	Private nursing homes, Maternity & Hospitals	571
3	NMC Hospitals	04
4	Municipal nursing homes	05
5	Dispensaries & City primary health center	30
6	Mobile dispensaries	00
7	Sonography centers	05 govt. 309 private
8	Govt. hospitals	02
9	ESIC hospitals	01
10	ISP hospitals	01
11	Immunization center	182
12	Aids center	01
13	Gov. Recognized MTP center	123
14	Family planning centers	07
15	Leprosy unit	01
16	Leprosy center	11
17	Medical centre	30
18	Vaccination centre	30

Source- Health Department, NMC.



7.2 Patient information in the Nashik city

Sources of different diseases along with the no. of patient and death record are given in Table 7.3.

Table 7.3 - Details of Patients in Nashik city

Sr. No.	Source	Condition/Disease	No. of Patients		No. of Deaths	
			2018-19	2019-20	2018-19	2019-20
1	Mosquito	Malaria	2	0	0	0
		Dengue	1124	62	2	0
2	Water	Gastro	6	6	0	0
		Jaundice	96	27	0	0
		Inflammation of the stomach and intestines	0	0	0	0
		Typhoid/Typhoid fever	1155	54	0	0
3	Physical relations	AIDS	111	208	0	0
		S.T.D.	0	0	0	0
4	Air	Respiratory Disease	18403	19308	2	1
		Swine Flu	178	6	11	0
		Chicken Guinea	2	7	0	0
5	Other	Heart Attack	4229	6537	3	4
		Brain Disease (Meningitis)	0	0	0	0
		Cancer	2	3	2	0
		Total Natural Death	-	-	13157	12765
		Total infant mortality	-	-	154	147
		Corona virus	0	0	0	0

Sources - Health Department, NMC

Nashik Municipal Corporation contains

- Registered Private Hospital - 571 number and Medical stores are 1156 numbers respectively.



Table 7.4 - Various Camps Organized in Nashik City which are as follows;

Public awareness programs - Action taken about the awareness of Swine Flu through 8 hospitals of Nashik Municipal Corporation		
1.	Home volunteer training program	3
2.	Workshop on the occasion of World Malaria Day	01
3.	Rally on the occasion of World Malaria Day	05
4.	World Health Day Workshop	1
5.	Counseling about pest related illness in school	20

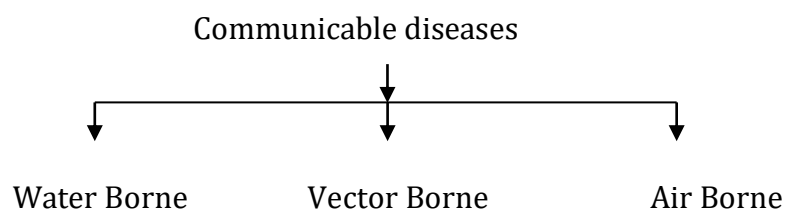
Source: Health Department, Nashik Municipal Corporation

7.3 Communicable Diseases

Communicable diseases are the state of unhealthiness caused by microorganisms and are transmitted from an infected person to others. These diseases are largely transmitted by direct or indirect contact with an infected person. They can spread due to air-borne bacteria or viruses i.e. they get expelled from the nose and mouth of the infected person and inhaled or ingested by anyone in close proximity, or physical contact with an infected person's bodily fluids. Some well-known examples of such diseases can be the common flu or influenza, chicken pox, measles, mumps and the endemics like HIV/AIDS and Ebola.

Communicable diseases can be classified based on various causative agents, the clinical syndrome, or the mode of transmission. Usually all 3 characteristics are used (e.g. food borne, enteric bacteria gastroenteritis). Responsible agents include helminthes, protozoa, bacteria, fungi and viruses. Examples of diseases caused by bacteria are Pneumonia and gonorrhoea. Measles and Ebola are caused by viruses as pathogens. Protozoan infections can cause parasitic diseases. Certain fungal infections (e.g. histoplasmosis) are also transmittable.

Depending on the mode of transmission, communicable diseases are categorized into:





7.3.1 Water Borne diseases

Water borne diseases are the diseases caused by contaminated drinking water at its source or in the distribution system, or by direct contact with recreational waters. Waterborne diseases result from ingestion of water which contains pathogenic microorganisms or chemicals. Gastroenteritis, diarrhea, hepatitis and typhoid are some of the commonly occurring water borne diseases/ conditions in Nashik city. The status of the patients whose death occurred due to water borne disease is presented above in **Table No. 7.3**

As seen in the table there is a continual and remarkable decrease in all the water borne diseases however, in the year 2019-20 the number of cases for gastroenteritis registered an decrease by 6 patients. Norovirus is known to cause gastroenteritis and commonly occurs due to consumption of contaminated food and water. Norovirus is contagious and may be caused upon being in contact with an infected person.

7.3.2 Vector borne diseases

Vectors are life forms that transmit pathogens and parasites from one infected individual (or creature) to another, causing illnesses in human population. These maladies are usually found in the locales where there is no access to safe drinking-water and sanitation framework. As indicated by WHO, Vector-borne diseases ailments represent 17% of the assessed worldwide weight of every single irresistible illness, with dengue and intestinal sickness at the highest priority on the rundown.

Malaria

Malaria, a parasitic infectious disease, is transmitted by mosquitoes which breed in fresh or occasionally brackish water. The species of Plasmodium, a casual parasite of malaria resides in the body of Anopheles mosquito, which acts as a vector in transmission of the malarial infection is showing the no of the patients in 2019-2020, while no deaths occurred due to malaria.

Dengue

Dengue fever, also known as break bone fever, is a tropical disease caused by the dengue virus. The *Aedes sp.* of mosquito acts as the vector for transmission of dengue infection.



Symptoms of Dengue include fever, headache, muscle and joint pains, and characteristics of skin rash that is similar to measles. Dengue and dengue hemorrhagic fevers could be prevented by following good practices like managing water containers and avoiding accumulation and stagnation of freshwater in and around houses. Significant number of dengue patients was found in 2018-19 which gradually decreased in 2019-20. As per table 7.3 two deaths occurred in 2018-19 and zero death occurred in 2019-20.

Preventive measures

1. Proper management of the water resources would ultimately lead to clean and healthier environment.
2. Disinfecting of the city's water supply.
3. Chemical spraying and fumigation of the breeding sites.
4. Direct surveys by visiting the patient's home, collecting blood samples and providing medication.
5. Indirect surveys by examining the blood samples of the patients suffering from fever and visiting the primary health care centers, women and child hospitals and other government hospitals.
6. Awareness to the public about disinfection of the water using house method like boiling and filtration.

7.3.3 Air Borne Diseases

Airborne diseases are caused by pathogens that are transmitted through the medium of air. As per Directorate General of Health Services, Ministry of Health & Family Welfare, Government of India, TB (Tuberculosis), respiratory diseases and swine flu are considered as the prototypic disease of airborne transmission. TB causing bacteria spread from person to person through tiny microscopic droplets when a TB patient coughs, sneezes, speaks, sings, or laughs. TB is caused by Mycobacterium tuberculosis that affects the lungs and the condition is known as pulmonary tuberculosis whereas when the infection is outside the lungs and affects other internal body parts it is known as extra pulmonary tuberculosis.

Swine flu is a respiratory disease caused by influenza viruses that infect the respiratory tract of pigs and result in a barking cough, decreased appetite, nasal secretions, and listless



behavior; the virus can be transmitted to humans. Swine flu viruses may mutate (change) so that they are easily transmissible among humans. Symptoms of swine flu in humans are similar to most influenza infections: fever (100 F or greater), cough, nasal secretions, fatigue, and headache. Swine flu is contagious from about one day before symptoms develop to about five to seven days after the onset; some patients may be contagious for a longer time span. After getting infected, the person will come down with the flu symptoms in 4-6 days.

In the year 2019-20 death recorded due to respiratory diseases and swine flu were 1 and 0 respectively. It is shown in table 7.3.

Health services and facilities provided by NMC:

Nashik Municipal Corporation regularly carries out the following measures for the well-being of citizens:

- 24 hour ambulance
- TB eradication programme
- Management & control of communicable diseases
- AIDS detection and guidance centre
- Registration of private practitioners, sonography centre and hospitals
- Action against unauthorized practitioners
- Sterilization of stray dogs
- Malaria/Dengue detection, prevention and control Program

❖ Others:- Corona virus disease (COVID-19)

- Corona virus disease (COVID-19) is an infectious disease caused by a newly discovered corona virus. Most people infected with the COVID-19 virus will experience mild to moderate respiratory illness and recover without requiring special treatment. Older people and those with underlying medical problems like cardiovascular disease, diabetes, chronic respiratory disease, and cancer are more likely to develop serious illness.
- The best way to prevent and slow down transmission is be well informed about the COVID-19 virus, the disease it causes and how it spreads. Protect yourself and others from



infection by washing your hands or using an alcohol based rub frequently and not touching your face.

- The COVID-19 virus spreads primarily through droplets of saliva or discharge from the nose when an infected person coughs or sneezes, so it's important that you also practice respiratory etiquette (for example, by coughing into a flexed elbow).
- At this time, there are no specific vaccines or treatments for COVID-19. However, there are many ongoing clinical trials evaluating potential treatments. WHO will continue to provide updated information as soon as clinical findings become available.

7.4 Non -Communicable Disease

Diseases which by definition are non-infectious and non-transmissible to other people are called non- communicable diseases. NCDs may be chronic diseases of long duration and slow progression or they may result in more rapid death, such as some types of sudden stroke. It includes diseases like heart disease, stroke, cancer, asthma, diabetes, chronic kidney disease, osteoporosis, Alzheimer's disease, cataract, etc.

*According to the indicators given by **DPSIR**, health service is an important indicator and its objective is to improve health conditions. Health service indicator costs are linked to social, economic and environmental conditions in a city. Improving the health of people as well as of the environment is necessary for sustainable economic growth, and is a precondition for reducing poverty.*

7.5 Veterinary Department

For animal health care in NMC, veterinary doctors are available (Table 7.5). The NMC takes care of the health of stray dogs by vaccinating them against various diseases.

Steps taken to control on-street and rover dogs-

To control stray dogs in city, Nashik Municipal Corporations Veterinary Department catches these dogs after the complaints received from citizen. These dogs are freed again on the same place, after spaying and neutering them.



Table 7.5 Activities for Veterinary Section

Mentioned activities of Veterinary Dept.		
Sr. No.	Current	Proposed
1	Animal birth control (A,B,C Program) in stray dogs	More number of A,B, C Centers in city town to reduce unwanted dog population
2	Pet cemetery working	Starting of pet incinerator machinery
3	Disposal of large animal carcasses	Disposal of chicken waste, market and fish waste in scientific manner

Source- Animal Husbandry Department, Nashik Municipal Corporation.

Summary

- Good Health is essential for sustainable economic growth and reduces poverty and improves people's health environment.
- Transformed ecosystem research component of the World Health Organization, 80 percent of this is because of the spread of diseases.
- Health service facilities
 1. Vaccination
 2. Pulse Polio programme
 3. Eye Examination
 4. Infectious Disease
 5. Water Sickness
 6. Preventive Measures
 7. Ambulance
 8. Tuberculosis Eradication
 9. Management And Control Of Infectious Diseases
 10. Aids Detection And Guidance
 11. Non Infectious Disease
 12. Veterinary Department
 13. Dog Vaccination And Sterilization



R - Response

Different activities and programmes are conducted in Nashik by Nashik Municipal Corporation by medical department.

NMC Medical Department organized Leprosy detection drive

Nashik Municipal Corporation, Medical Department under Pradhan Mantri Pragati Yojna organized Leprosy Case Detection Campaign (LCDC) from 19th September to 4th October, 2016 in selected areas of the city to detect hidden leprosy cases and to spread awareness about the disease.

The campaign, which falls under the National Leprosy Eradication Programme, is aimed at detecting and treating all leprosy cases in the 16 districts of Maharashtra.

These districts include Thane, Raigad, Palghar, Dhule, Jalgaon, Nashik, Nandurbar, Amravati, Yavatmal, Washim,



Nagpur, Wardha, Chandrapur, Bhandara, Gondia, and Gadchiroli.

The purpose of the campaign was to look for patients having depigmented or hypopigmented patches on the skin along with loss of sensations or deformity in hands or feet.

In Nashik Municipal Corporation only those

areas were selected where the prevalence rate and the annual case detection rate was more. In this survey our head teams visited each and every house of those affected areas and they screened the people for any kind of signs and symptoms of Leprosy such as a patch or nerve involvement or any such signs. Suspected patients were referred to

respective health centers. After detecting if the case in detected the patient were referred to the Peripheral Health Center (PHC), Doctor confirmed the case and the patient was immediately put on multi-drug for leprosy treatment for six months or one year according to the classification of leprosy.

In this team there were one female member and one male member compulsory and all the members of the house were screened except the children below two years of age. There were 325 team and 650 members as well as supervisors conducting this survey for 14 days.

Nashik Municipal

Corporation had selected the following areas for the survey such as: Morewadi UPHC, Ambad UPHC, Kamatwada UPHC, CIDCO UPHC, Sanjeev Nagar UPHC, Bajrang Wadi UPHC, Wadala UPHC, Kathada UPHC, Hirawadi UPHC, Walmik Nagar UPHC, Upnagar UPHC, Vihitgaon UPHC and Sinnar Phata UPHC.

All staff conducting this survey were trained for screening of Leprosy and UPHC level of training had also been completed on 16th September, 2016 and accordingly were ready for the survey being conducted from 19th September 2016, informed Medical and Health Officer Dr. Vijay Dekate.



Chapter 8

Air Quality

8.0 Introduction

Contamination implies the addition of impurity or poisonous substance in air, or increment in any factor which influences life adversely. The wellsprings of air contamination in urban territories significantly are autos (vehicles), businesses and so forth. The real Air discharges include PM₁₀, PM_{2.5}, Carbon Monoxide (CO), sulphur oxides (SO_x), Nitrogen oxides (NO_x), Hydrogen sulphide(H₂S) and so on.

Air is an essential factor of environment. Air is the blend of different gases which keeps up the atmosphere of the Earth.

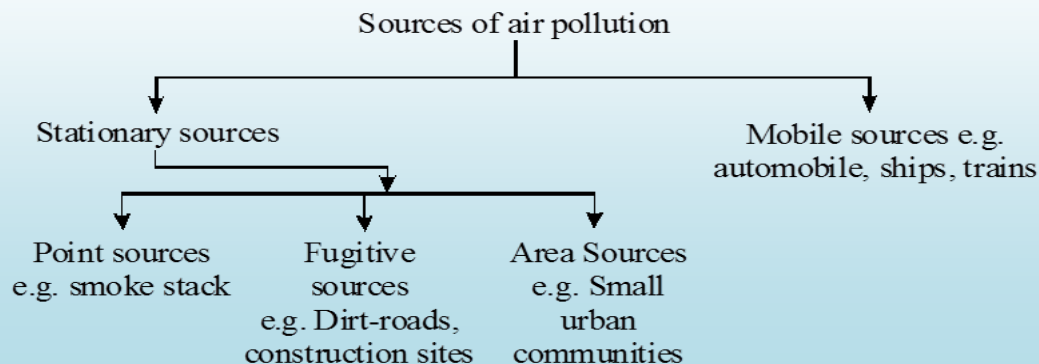
Factors responsible for air pollution and their percentage are as follow -

- A) Suspended particulate matter (SPM), PM_{2.5} - 2.5 μ sized particulate matter
- B) Suspended particulate matter (SPM), PM₁₀ - 10 μ sized particulate matter
- C) Sulphur dioxide - 80 μ g/m³
- D) Nitrogen Oxide - 80 μ g/m³

Sources of Air Pollution (D - Driving Force)

[A] Type-I sources of Air Pollution: Natural and Anthropogenic

[B] Type II sources of Air Pollution: Stationery & Mobile sources





S-Status

CPCB- NAAQ Standards for Air quality:

According to standards stipulated by CPCB, desired levels of various components of air are given in the following table 8.1.

Table 8.1 - CPCB-NAAQ Standards of Ambient Air Quality

Sr.No	Pollutants	Time Period	National Ambient Air Quality Standards (NAAQS)	
			Industrial, Residential, Rural & Other areas	Ecologically Sensitive Areas
1	Sulphur Dioxide (SO ₂) -µg/m ³	Annual	80	80
2	Nitrogen Dioxide (NO ₂) -µg/m ³	Annual	80	80
3	Particulate Matter (PM ₁₀) -µg/m ³	Annual	100	100
4	Particulate Matter (PM _{2.5}) -µg/m ³	Annual	60	60
5	Ozone (O ₃) -µg/m ³	8 hrs.	100	100

Note: All parameters are in (µg /m³)

Source: CPCB

8.1 Air Quality Monitoring Status

Objectives of Air quality Monitoring

1. To check the quality of air in the atmosphere.
2. To check whether the air quality is as per the prescribed standards.

For this reason, air quality observing stations have been selected for different 08 locations namely, Trimbak road ITI Signal, Satpur MIDC, Ambad MIDC, Panchvati Karanja, Old CBS, Mumbai Naka, Main Road, Dwarka, etc within NMC area (Fig 8.6).

8.1.1 Overview of PM levels in Nashik city for Residential & Industrial area (PM₁₀ and PM_{2.5})

The air quality monitoring is assessed quarterly for different locations and average results are given in below table 8.2. Comparative study of the various air pollutants with the NAAQS standards are depicted in the fig 8.1-8.5.



Table 8.2 - AAQ in Nashik City for January

S.No	Name of the Parameter	Results				
		PM ₁₀ (µg/m ³)	PM _{2.5} (µg/m ³)	SO ₂ in µg/m ³	NO _x in µg/m ³	CO in µg/m ³
	NAAQS Limits	100	60	80	80	04
1	Trimbak road ITI signal	78	34	90	54	3
2	CBS	112	45	58	26	42
3	Pachavati Karanja	123	36	64	54	1
4	Dwarka Circle	119	83	85	14	0.5
5	Mumbai Naka	98	33	78	28	54
6	Pathardi Phata	106	43	73	55	15
7	Bytco Chowk	94	15	89	40	4

Source: Green Envirosafe Engineers and Consultant Pvt. Ltd., Pune

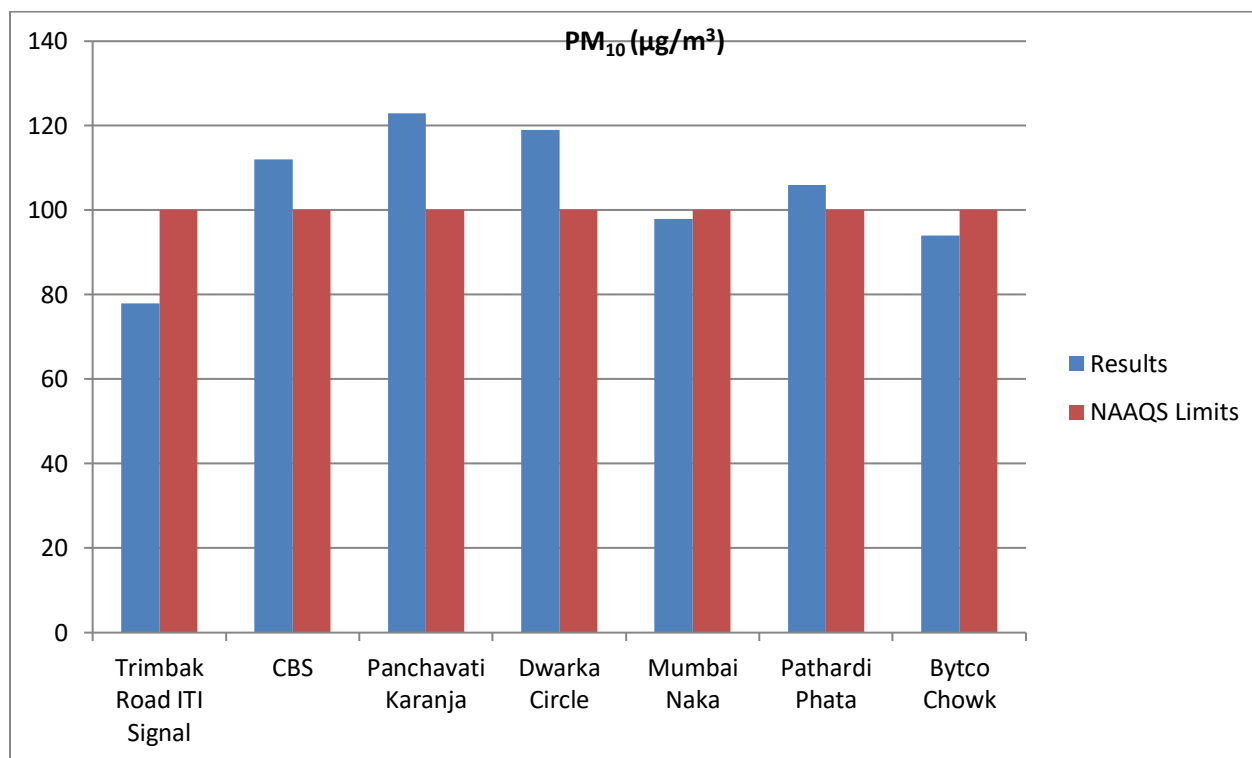


Fig 8.1 - Results for PM₁₀ at 7 different locations

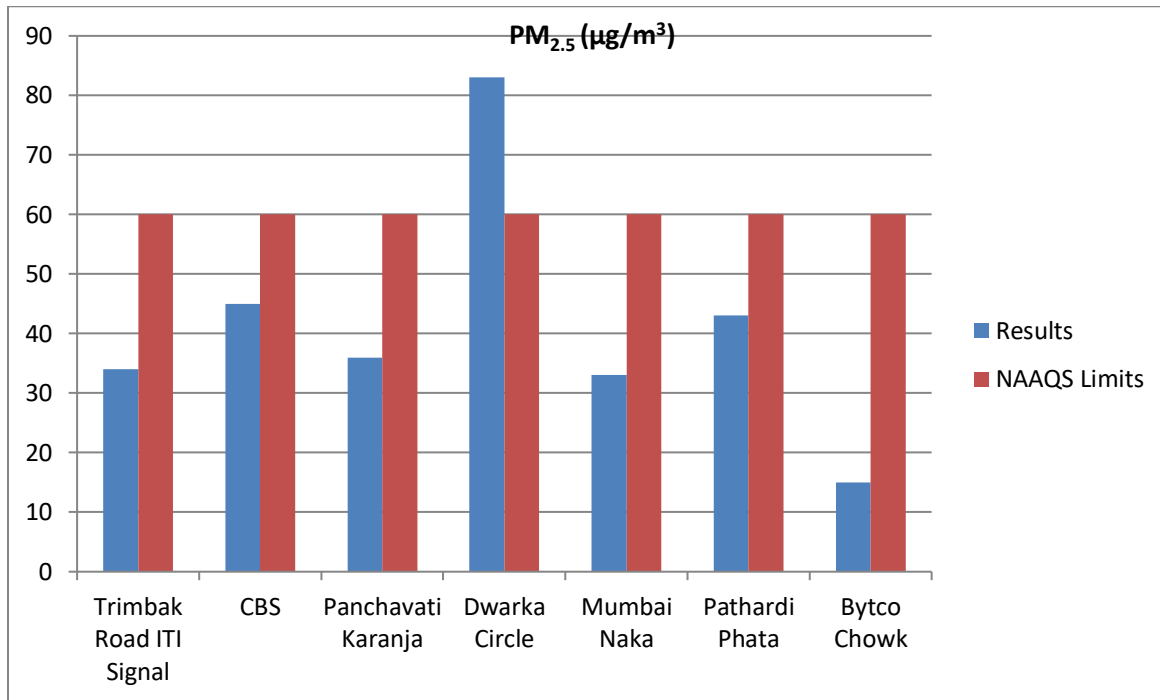


Fig 8.2 - Results for PM_{2.5} at 7 different locations

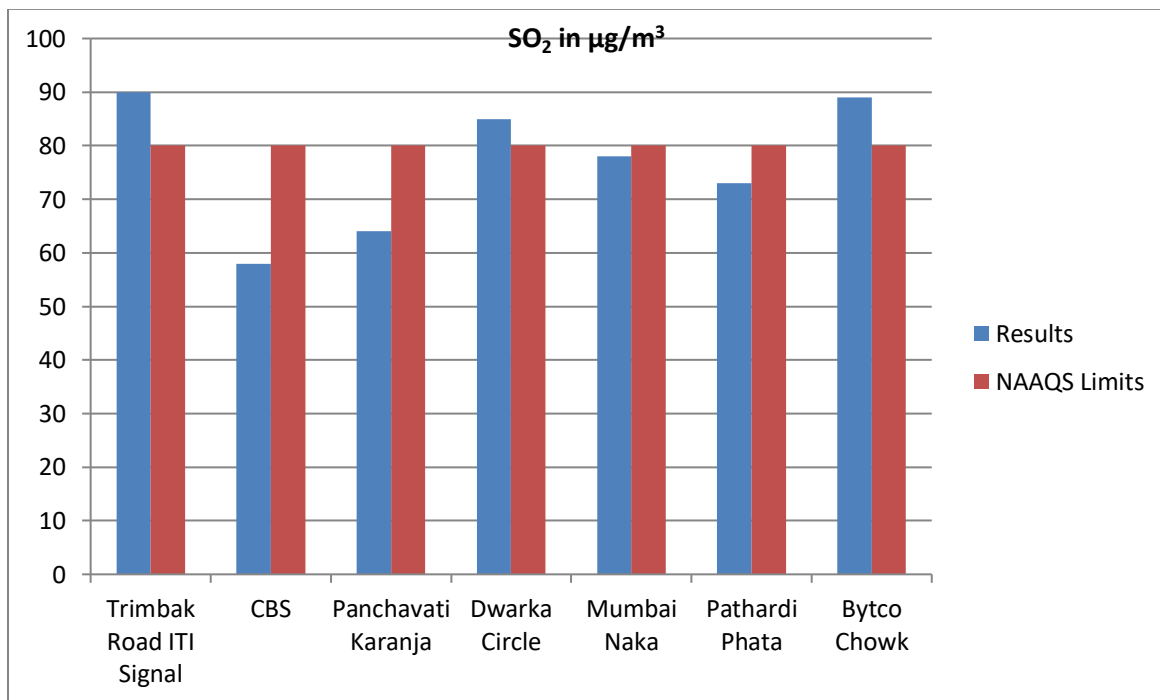


Fig 8.3 - Results for SO₂ at 7 different locations

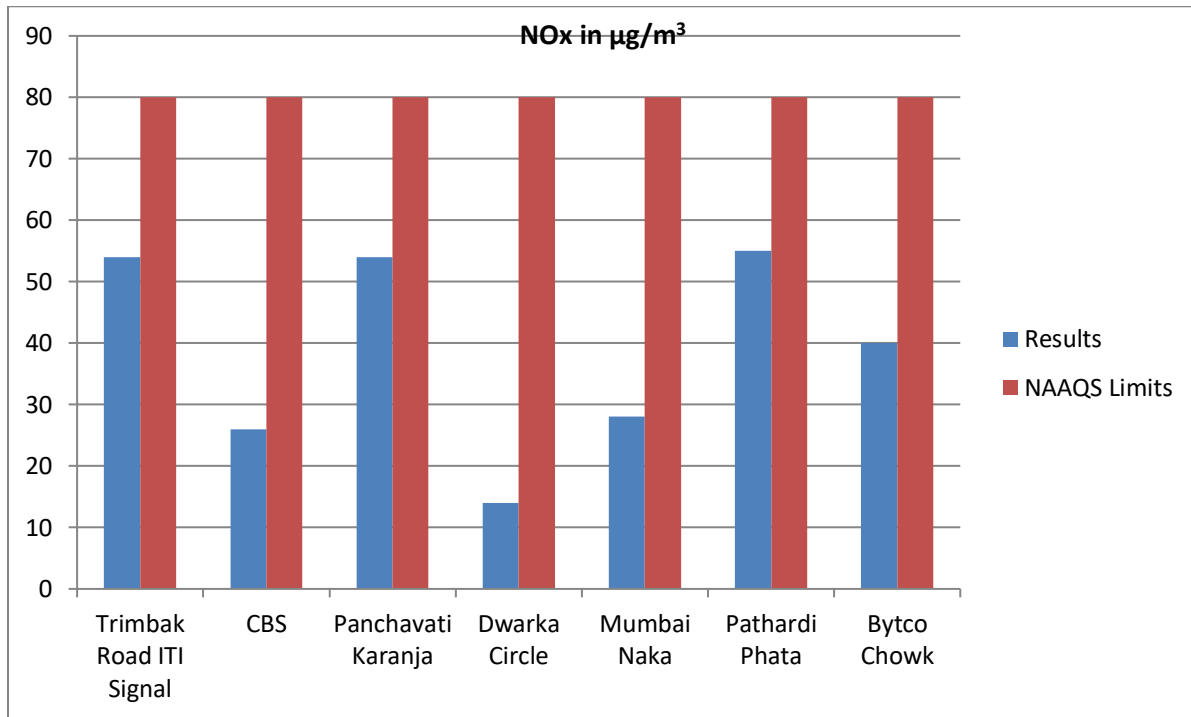


Fig 8.4 - Results for NOx at 7 different locations

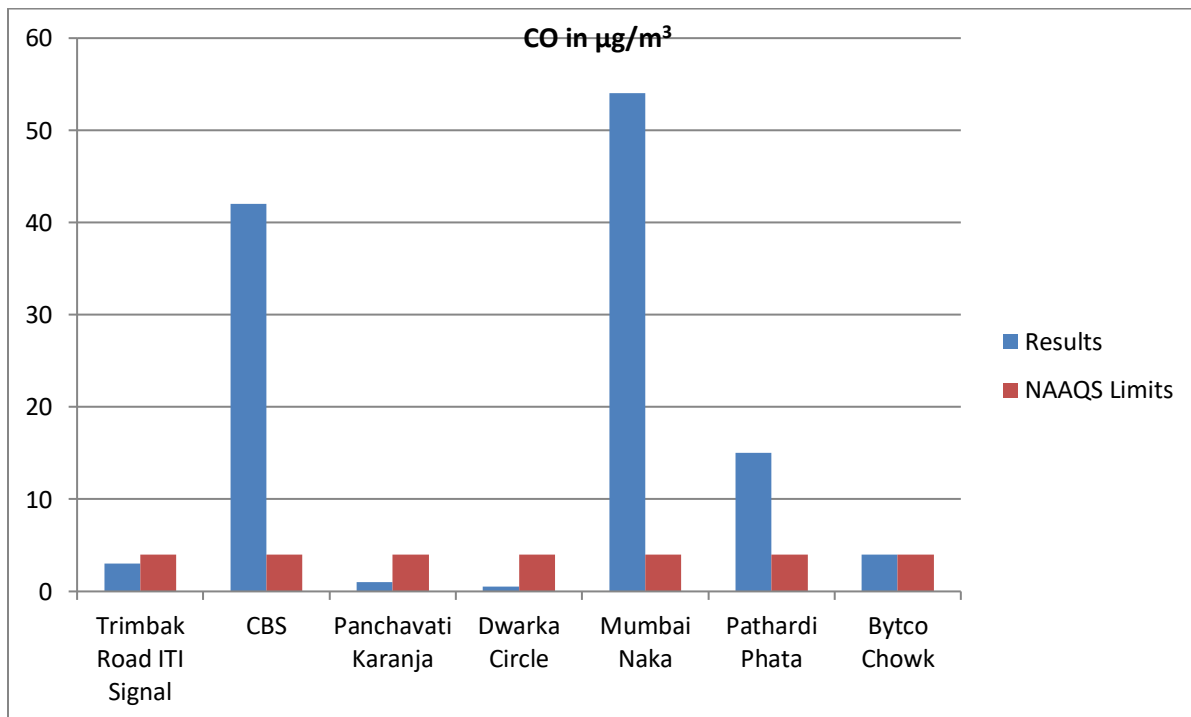


Fig 8.5 - Results for CO at 7 different locations



Trimbak Road ITI Signal



Bytco Chowk



Panchavati Karanja



Pathardi Phata



Mumbai Naka



CBS



Dwarka Circle

Fig 8.6 – Air Monotoring Photos



Conclusion

1. From above result and graph, it is concluded that the average level of PM_{10} exceeds NAAQS limits at 4 locations while that of $PM_{2.5}$ is within the prescribed NAAQS limit for all locations except Dwarka Circle. As compared to all locations PM_{10} is high at Panchavati Karanja and low at ITI Signal.
2. The values of SO_2 exceed the standard limits at 3 locations and lowest values are seen at CBS and Panchavati Karanja.
3. From the graphical representations it can be stated that Nitrogen Oxides results are within the NAAQS limits but the lowest values are seen at Dwarka Circle.
4. The level of CO exceed the prescribed NAAQS limit for 3 locations, lowest value being seen at Dwarka Circle.

8.1.2 Wind Rose Information

Wind rose diagram is used to demonstrate air direction and speed at particular area in a year. All four directions are shown by 0 - 360 in a spherical diagram. Length of line originating from the centre of spheres indicates frequency, velocity, as well as air direction. Study of Wind rose is normally used for examination of atmosphere, oceanic winds, air pollution, construction of runways etc. It is also useful for architects and experts for the planning of building in city.

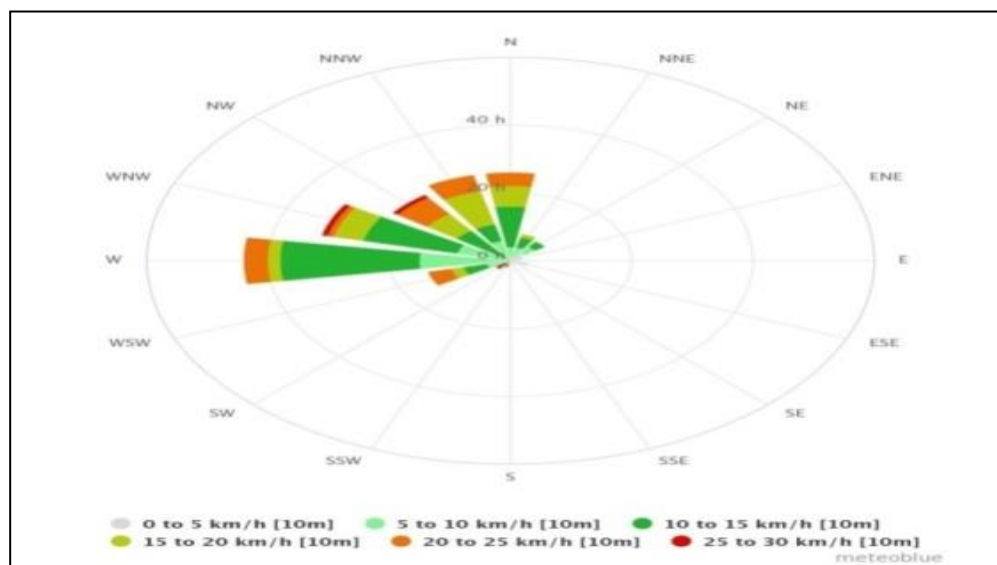


Fig 8.7 - Wind Rose diagram of Nashik area



The corresponding results were used to draw wind-rose for 00-24 hours during study period (**Fig. 8.7**). The wind-rose diagram indicates that the predominant winds are from E and ESE sectors with the dominant wind speed class of 0.5-11.1 m/s and calm condition of 0.00%. Local prevailing wind pattern during the study period was in the conformity with the climatologically normal wind pattern of the region. The data indicate that the average temperature and relative humidity varied in the range of 12°C to 38°C and 18% to 98% respectively.

Climatologically data station of IMD Nasik presented in Table 8.3.

Table 8.3 - Climatologically Data Station IMD Nasik (Maharashtra)

Months	Temperature (°C) (Mean)		Relative Humidity (%)	Rainfall (mm)
2019	Range		Mean	Monthly Total No. of days
October	27	20	82.00	298.1
November	28	20	65.00	39.5
December	28	20	58.00	7.7
Annual (Avg.)	23.66		68.33	115.1

Source: <https://www.worldweatheronline.com/>

Automotive exhaust is the major source of the total emission. Automobile exhaust consists of wide range of pollutants from simple to carcinogenic substances such as (1) Hydrocarbons (Unburnt), (2) Carbon monoxide, (3) Oxides of nitrogen (NO_x), (4) Lead oxides, (5) Particulate matters e.g. lead, carbon, alkaline earth compounds, iron oxide, tar, oil, mist (6) Traces of aldehydes, esters, ethers, sulphur dioxide, peroxides, ketones benzene (C₆H₆), 1, 3 butadiene, Poly Aromatic Hydrocarbons (PAH).

Summary

The MPCB is monitoring air pollution in six selected sampling areas. PM_{2.5} component is considered the most dangerous as it can penetrate deep into the lungs. In winter season, PM_{2.5} component is exceeding the permissible limits in residential and industrial sectors. Air pollution of city has increased since 2010. If the air pollution continues to increase at this rate, it will lead to poor air quality as compared to other metropolitan cities. It is the need of the hour to use public transport at large rather than using individual vehicles, to reduce air pollution.



Table 8.4 - Health effects on human P – Pressure & I - Impacts

No.	Pollutant	Major Sources	Effects
1	Sulphur Dioxide (SO₂)	Volcanoes, acid rains, industrial processes	Heart disease, respiratory diseases, cancer, irritation to eyes, head ache
2	Nitrogen Oxides (NO_x)	Automobile Exhaust	High concentration cause respiratory irritation, Eye Irritation
3	Carbon Monoxide (CO)	Natural air, coal, wood, vehicular emissions	High reaction affinity with blood haemoglobin. Reduces oxygen transport capacity of blood and Fatigue
4	Suspended Particulate Matter (SPM) PM₁₀, PM_{2.5}	Cyclones, volcanic eruption, vehicular exhausts, industrial stack emissions etc.	Small size particles poses health hazards due to their infiltration capacity into respiratory system, allergy
5	Photochemical Oxidants Ex. Ozone	Secondary pollutants from primary pollutants.	lowered lung functionality, eye irritation, cough
6	Lead	Unburnt HCs from vehicles	Problems in hemoglobin synthesis. Anemia, affects nervous system and kidneys.
7	Greenhouse Gases	Carbon Dioxide, methane, Evaporation, chlorofluoro carbons.	Global warming, weather changes, ice melting, growth of sea level.

Checking of these infections is an imperative parameter to know the status of the wellbeing of the city. NMC is stepping up with measures in regards to maintaining and updating information of patients experiencing the above mentioned diseases through a joint exercise between private and Government healing centers.

R – Response

Measures to reduce Air Pollution:

- Use of public transportation:
By using the public transport facility, air pollution can be reduced substantially. Also, it is more economical and safe.
- Improvement in transport infrastructure, roads, vehicle designs and better traffic management.



- Access to clean fuel and electricity to reduce outdoor and indoor air pollution by promoting renewable energy such as solar energy.
- Regular air quality monitoring to ensure uniformity as per standards all over city area.
- Road side tree plantation.

Plan to reduce Air Pollution

1. In order to reduce traffic congestion, roads have been widened. WBM roads are planned to be black topped. Necessary measures are to be taken during demolition work of buildings.
2. Cycle track to encourage the use of cycles have been proposed.
3. To check Air Quality in the city, AAQMS has been placed in five selected areas by MPCB.
4. Tree Plantation Programmes are being implemented on a large scale to reduce air pollution.

Proposed Initiatives

NMC is taking following initiative :-

1. Debris generated from demolition of old building leads to increase in air pollution, necessary measures to be taken during demolition work.
2. To increase the green cover in and around the city.
3. Intensively cover WBM Road with bituminous surface.
4. Not allowing people to burn garbage & imposing heavy penalty if they are found doing so.
5. Farmers in nearby localities to compost the agricultural residues .
6. Encourage people to use ready mix concrete instead of cast in-situ concrete.
7. Encouraging people to use public transport & cycles.



Chapter 9

Water Supply

9.0 Water Pollution

Water is an important factor for sustaining ideal environment, comprising of all kinds of living beings, including human and biotic factors, together with ground & surface water. Godavari River acts as a life line of the Nashik city. The Gangapur Dam (Earthen Dam) was constructed on Godavari River to fulfill the water requirement of growing population of Nashik city. The dam not only fulfills the drinking water requirement, but also provides the water for irrigation and industries. In Nashik city, about 3.57% of the area is covered by surface water.

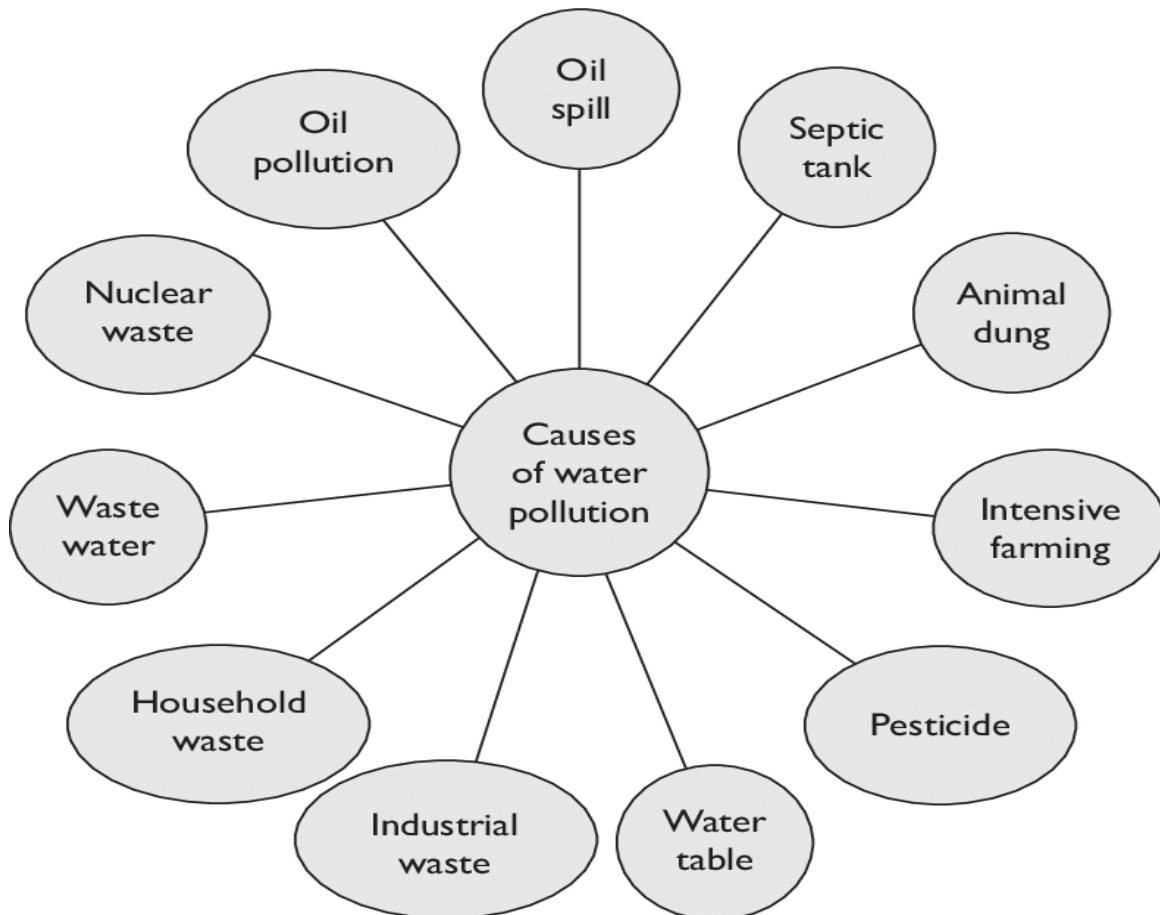


Fig 9.1- Causes of Water Pollution



Sources of water in Nashik Corporation area:

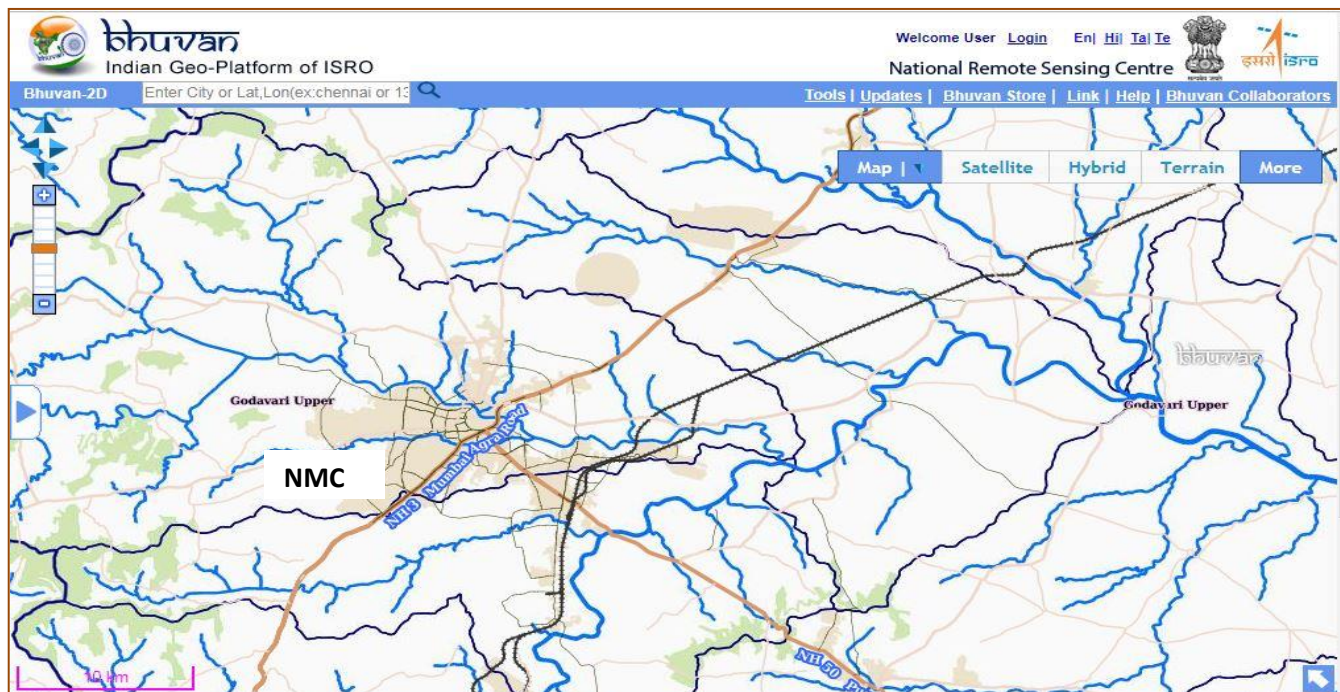
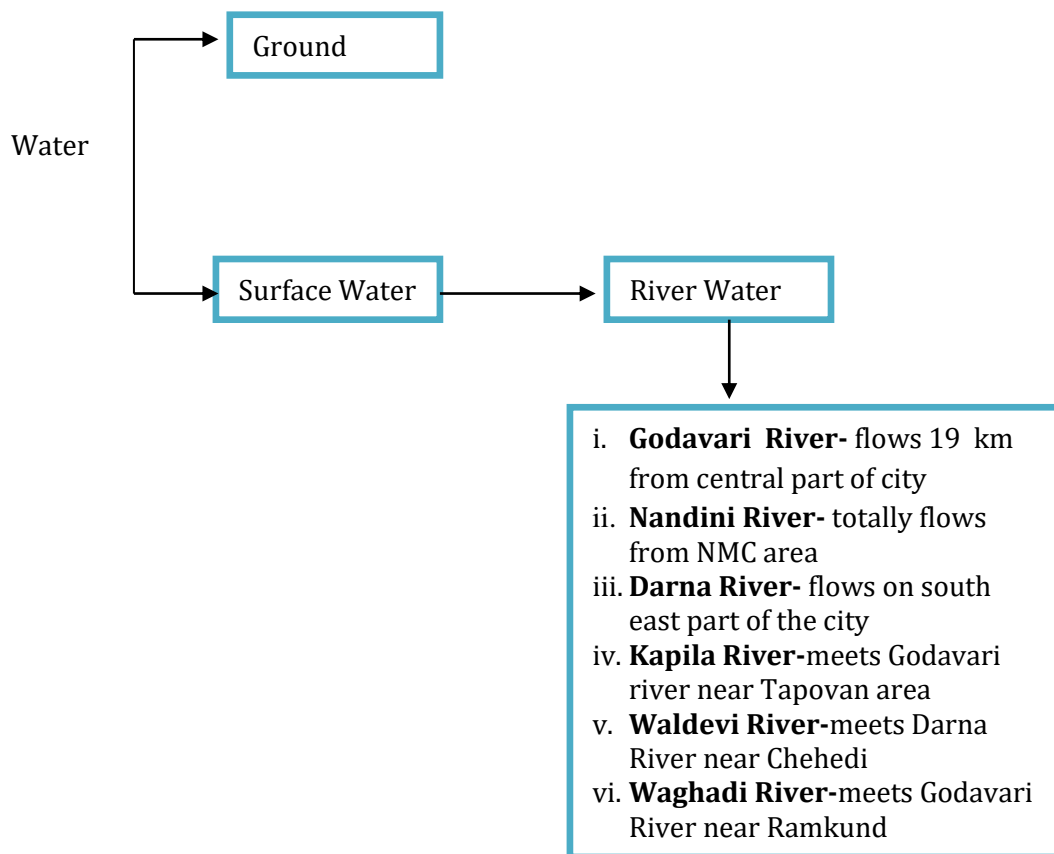


Fig 9.2- Latest Satellite imagery of hydrology network map of NMC area

Source: NRSC, Hyderabad



9.1 Ground water

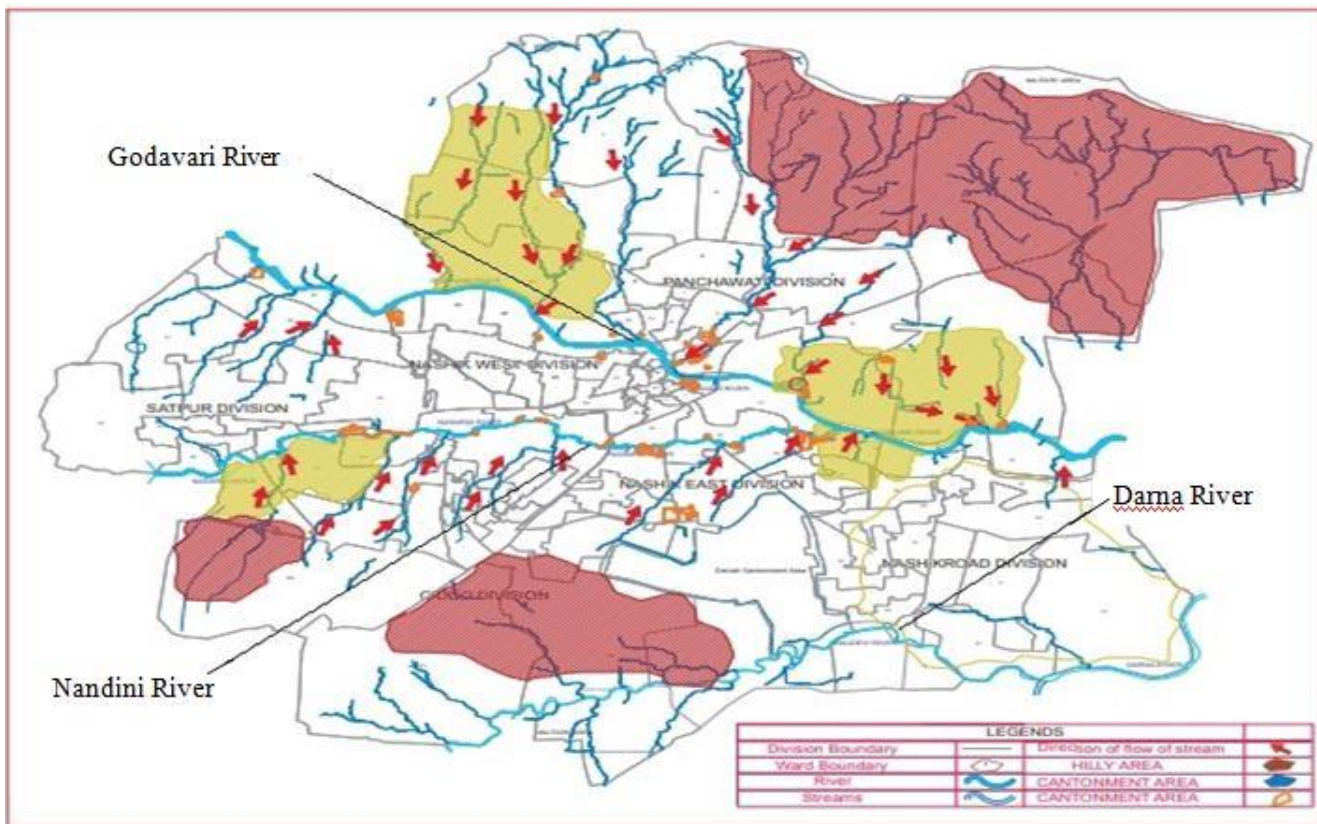


Fig 9.3- River Network Nashik Municipal Corporation Area

(Source: City Sanitation Plan, Nashik City)

According to Environment Protection Agency, ground water is the source of drinking water for millions of people. According to the reports, groundwater use accounts for nearly 80% of the rural domestic needs and 50% of the urban water needs in India. Groundwater is an important source of irrigation water in agricultural sector with low capital cost. Ground water is used as an alternative source by considering the increasing demand of water for the citizens. Levels of ground water that depends on geologic structure are likely to be different in various localities of the city. Ground water is used for the domestic, agriculture, construction purpose etc., are drawn through bore well, well, etc. It is difficult to measure the total groundwater being extracted by the citizens. Department of Groundwater Surveys & Development Agency (GSDA) is working on the scientific study of 'Groundwater' in the city. The main objective of this department is to monitor the impact of natural & manmade components on groundwater quality, level and rate of extraction.

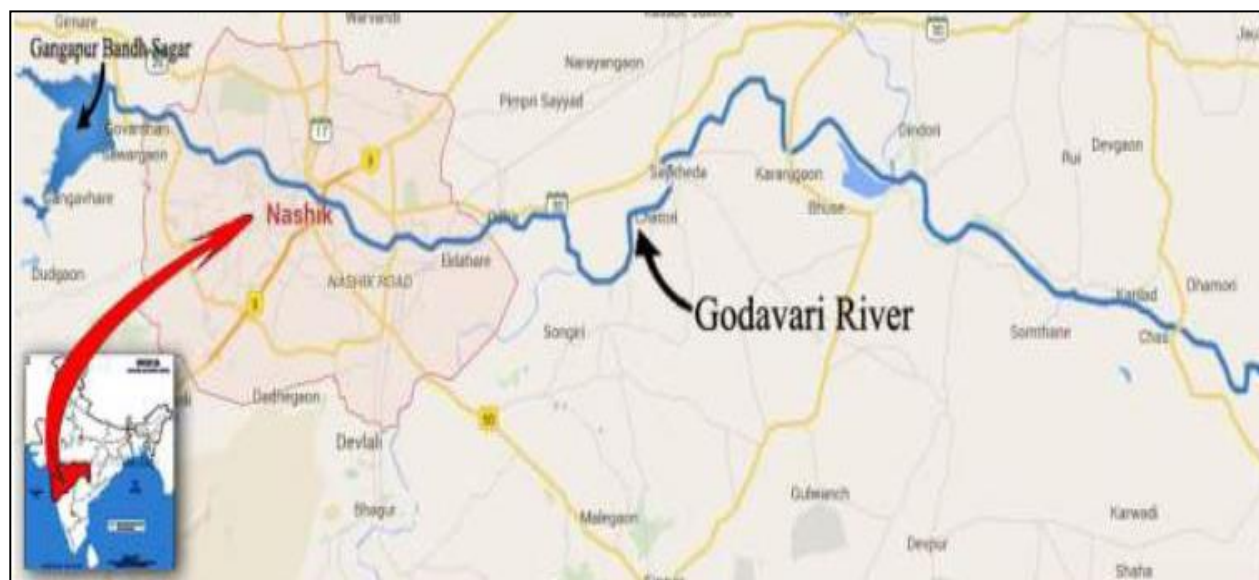


9.1.1 Surface water (Rivers) in NMC

In Nashik city, Surface water sources primarily consist of Godavari River, Nandini River and Darna River. Godavari River, having a length of 19 km, flows through the central part of the city. Similarly Nandini has a length of 16 km in the north and Darna (3.5 km) flowing through south east direction of the Nashik municipal corporation area.



Gangapur Dam



Godavari River Map



D-Driving Force

Water Pollution

Water pollution is contamination of water bodies (e.g. Lakes, River, Ocean, Aquifers or Ground Water) usually as a result of human activities. Water pollution is one of many types of pollution which results from contaminants being introduced into the natural environment. Water pollution occurs when pollutants (particles, chemicals or substances that make water contaminated) are discharged directly or indirectly into water bodies without enough treatment to get rid of harmful compounds. Pollutants get into water mainly by human causes or human factors. Water pollution can be a **Point-source, Non-Point-source or Trans-boundary** in nature.

9.1.2 Types of Water Pollution

Water pollution can occur from a number of different sources. A point source is a single, identifiable source of pollution, such as a pipe or drain. Industrial waste is commonly discharged to the rivers and the sea in this way. High risk point source waste discharges are regulated through different control bodies. Non point source pollution results when contaminants are introduced into the environment over large, widespread areas.

Nutrient discharge from agricultural runoff, surface water pollution due to incoming hazardous waste, oxygen depletion due to over microbial degradation, ground water pollution, chemical pollution, oil spillage, etc., are the major sources of the water pollution.

A) Chemical pollution

Water pollution occurs when undesirable foreign substances are introduced into natural water. The substances may be chemical or biological in nature. The common pollutants includes human or animal waste, pathogens, radioactive materials, toxic metals such as lead or mercury, agricultural chemicals such as pesticides, herbicides or fertilizers, acid rain, high temperature water discharged from power plants, often called thermal pollution, etc. There are many sources of chemical pollutants, as our technological advances have made us a species largely reliant on chemicals and these chemicals are toxic to life and our environment.



Metals and solvents from industrial work can pollute rivers and lakes. These are poisonous to many forms of aquatic life and may slow their development, make them infertile or even result in death. Pesticides are used in farming to control weeds, insects and fungi. Run-offs of these pesticides can cause water pollution and poison aquatic life. Subsequently, birds, humans and other animals may be poisoned if they eat infected fish. Petroleum is another form of chemical pollutant that usually contaminates water through oil spills when a ship ruptures. Oil spills usually have only a localised effect on wildlife but can spread for miles. The oil can cause the death of many fish and stick to the feathers of seabirds causing them to lose the ability to fly.

B) Oxygen Depletion

Hypoxia or depletion of dissolved oxygen in water bodies normally occurs due to heavy pollution load and increased microbial degradation. Oxygen depletion may be classified as either generalized affecting the whole body or local affecting region or the water body. Microorganism present in water feed on the biodegradable substances. These biodegradable organic substances may be added through point sources or non point sources. Microorganism require large amount of oxygen for the degradation of these substances. Increased number of microorganism demands more dissolved oxygen leading to oxygen depletion.

At the depth, the aerobic organisms die because of low level of dissolved oxygen. This type of condition encourages anaerobic microorganisms. Dissolved oxygen level in the water is inversely proportional to the temperature. In warmer condition oxygen level goes down. Algal blooms and decaying organic matter are the primary causes of oxygen depletion and can occur in large number in still warm water bodies.

C) Eutrophication

It is taken from the Greek word *eutrophos* meaning well nourished. Such kind of condition develops when water bodies are overly enriched with minerals and nutrients that induce excessive growth of plants and algae. This process also deplete dissolved oxygen level. Excessive growth of phytoplanktons in the water body is known as blooms which is the best example of eutrophication. Continuous discharge of wastewater containing nitrate and phosphate (detergents), agricultural runoff (fertilizer), municipal waste water (sewage) etc, into water bodies helps in the



process of eutrophication. Farmers apply excess nutrients to the soil for better agricultural production. These nutrients leach into the soil where they remain for years. With rain they may drain into the water bodies. Some may drain into the ground water. When they enter into the water bodies, they enrich the water bodies with high amount of nutrients. This may lead to the fast growth of algal colonies which results in algal bloom. Algal bloom blocks the sunlight by creating a layer on the surface of the water body. The plants beneath the algal bloom die because they cannot get sunlight for photosynthesis. Eventually the algal bloom dies and settle at the bottom. Bacteria begins to decompose the algal bloom. This decomposition deplete oxygen from the water bodies. Larger life forms suffocate to death and water body can no longer support life. According to the scientists, the primary limiting factor for eutrophication is phosphate. Available phosphorus generally promotes excessive plant growth and decay, favouring simple algae and plankton over other more complicated plants and causes a severe reduction in water quality.

D) Suspended matter

Some pollutants do not dissolve in water as their molecules are too big to mix with the water molecules. These materials are called suspended particulate matter and can often be a cause of water pollution.

The suspended particles eventually settle and cause a thick silt at the bottom. This is harmful to marine life that lives on the floor of rivers or lakes. Biodegradable substances are often suspended in water and can cause problems by increasing the amount of anaerobic microorganisms present. Toxic chemicals suspended in water can be harmful to the development and survival of aquatic life.

P-Pressure

- 1 The water level is depleted due to the continuous use of ground water.
- 2 Due to Growing urbanization, number of bore wells increase.
- 3 Ground water pollution increases.
- 4 Fishing, washing clothes, bathing, rearing of cattle calves, etc. causes pollution of water.
- 5 Uncontrolled growth of weeds in water arises due to pollutants such as nitrogen, phosphate, etc. which leads to degradation of the water environment.



6 Water demand is increasing day by day in NMC area due to growing urban population.

S-Status

In order to provide sufficient drinking water for the citizens, Water Treatment Plants are in operation at six various zones of Nashik city for treating surface waters that is pumped from Gangapur Dam. The sewage that is being generated from domestic sources is treated within limits provided by pollution control board and then is discharged into river. Total 10 STPs in NMC area are present in which Domestic wastewater, being generated by regular activities of citizens is treated in different treatment plants of Municipal Corporation and treated sewage is released in rivers following sewage quality standards. A total of 10 Sewage Treatment Plants, are in operation at different locations of the city. Water pollution is measured in terms of following major parameters.

1. Dissolved Oxygen (DO)

Amount of oxygen dissolved (and hence available to sustain marine life) in water bodies such as a lake or stream, DO is the most important indicator of the health of a water body and its capacity to support a balanced aquatic ecosystem of plants and animals. Wastewater containing organic (oxygen consuming) pollutants depletes the dissolved oxygen and may lead to the death of marine organisms.

2. Biochemical Oxygen Demand (BOD)

Biochemical oxygen demand (BOD, also called **Biological oxygen demand**) is the amount of dissolved **oxygen** needed (i.e., demanded) by aerobic **biological** organisms to break down Organic material present in a given water sample at certain temperature over a specific time period.

3. Chemical Oxygen Demand (COD)

Chemical oxygen demand (COD) is a measure of the capacity of water to consume oxygen during the decomposition of organic matter and the oxidation of inorganic **chemicals** such as ammonia and nitrite.



9.1.3 Results of Surface water Analysis

River water samples were collected from selected stations during post monsoon seasons, analyzed for certain physical & chemical parameters results of analysis are given in **Table 9.1**.

River Godavari



River Nandini



River Waghadi



River Waldevi



Fig 9.4 - Monitoring of Different Rivers from NMC area



Table 9.1 - Physico-chemical parameters of Godavari River water samples on 16.01.2020

Sr. No	Name of sample	pH	DO	BOD	COD	TSS
			(mg/lit)	(mg/lit)	(mg/lit)	(mg/lit)
	MPCB limits	6.5 to 8.5	>2	<10	<150	<100
1	Upstream (Gangapur Gaon)	8.09	7.4	7	38	27
2	Midstream (Goda park)	9.08	4.9	7	35	29
3	Downstream (Tapovan)	8.35	6.8	26	61	45

Source- Accurate Analyzers Pvt. Ltd., Nashik

Table 9.2 - Physico-Chemical parameters of Nandini river water samples on 16.01.2020

Sr. No.	Name of sample	pH	DO	BOD	COD	TSS
			(mg/lit)	(mg/lit)	(mg/lit)	(mg/lit)
	MPCB limits	6.5 to 8.5	>2	<10	<150	<100
1	Upstream (ITI Bridge)	7.78	1.2	30	80	27
2	Midstream (City Centre Mall)	8.17	0.7	44	140	34
3	Downstream (Samaj Kalyan Vibhag)	7.68	3.4	27	100	38

Source- Accurate Analyzers Pvt. Ltd., Nashik

Table 9.3 - Physico-chemical parameters of Waghadi River water samples on 16.01.2020

Sr. No.	Name of sample	pH	DO	BOD	COD	TSS
			(mg/lit)	(mg/lit)	(mg/lit)	(mg/lit)
	MPCB limits	6.5 to 8.5	>2	<10	<150	<100
1	Upstream (Mhasrul Amardham)	7.95	3	57	154	88
2	Midstream (Juna Hatti Pool)	7.9	6.9	26	92	48
3	Downstream (Ganeshwadi)	7.72	5.2	9	38	32

Source- Accurate Analyzers Pvt. Ltd., Nashik

Table 9.4 - Physico-chemical parameters of Waldevi River water samples on 16.01.2020

Sr. No.	Name of sample	pH	DO	BOD	COD	TSS
			(mg/lit)	(mg/lit)	(mg/lit)	(mg/lit)
	MPCB limits	6.5 to 8.5	>2	<10	<150	<100
1	Upstream (Wadner Gate)	7.9	5.1	6	15	34
2	Midstream (Vihitgaon)	7.72	4.3	22	46	24
3	Downstream (Chehdi Pumping Station)	8.37	7	3	19	3

Source- Accurate Analyzers Pvt. Ltd., Nashik



1. *except pH, all other parameters are expressed in mg/l.*

2. *Note: DO- Dissolved Oxygen, BOD- Biochemical Oxygen Demand, COD- Chemical Oxygen Demand, TSS - Total Suspended Solids*

9.3 Water Treatment Plant (WTP) System in NMC

For continuous supply of water, three projects were established in the Nashik region namely Gangapur Dam, Kasyapi Dam and Gautami Dam. Gangapur dam is about 10 km from the Nashik city. This dam was constructed from 1954 to 1963. It has gross storage capacity of 48,910 cu mi. Kasyapi Dam is an earth fill dam on Kasyapi river a tributary of Godavari river. This dam is situated on upstream of Gangapur Dam. This dam has gross capacity of 12,641 cum. Gautami Godavari Dam is constructed on Gautami river at Trimbakeshwar. As Godavari River flows through Nashik city, traditionally city depends on Godavari River for water supply. One other source is from Darna Dam constructed on river Darna. This dam is about 28 km from Nashik city. This dam was constructed in 1934 with storage capacity of 7149 mcft.



Fig 9.5 - Aerial view of Water Treatment Plant

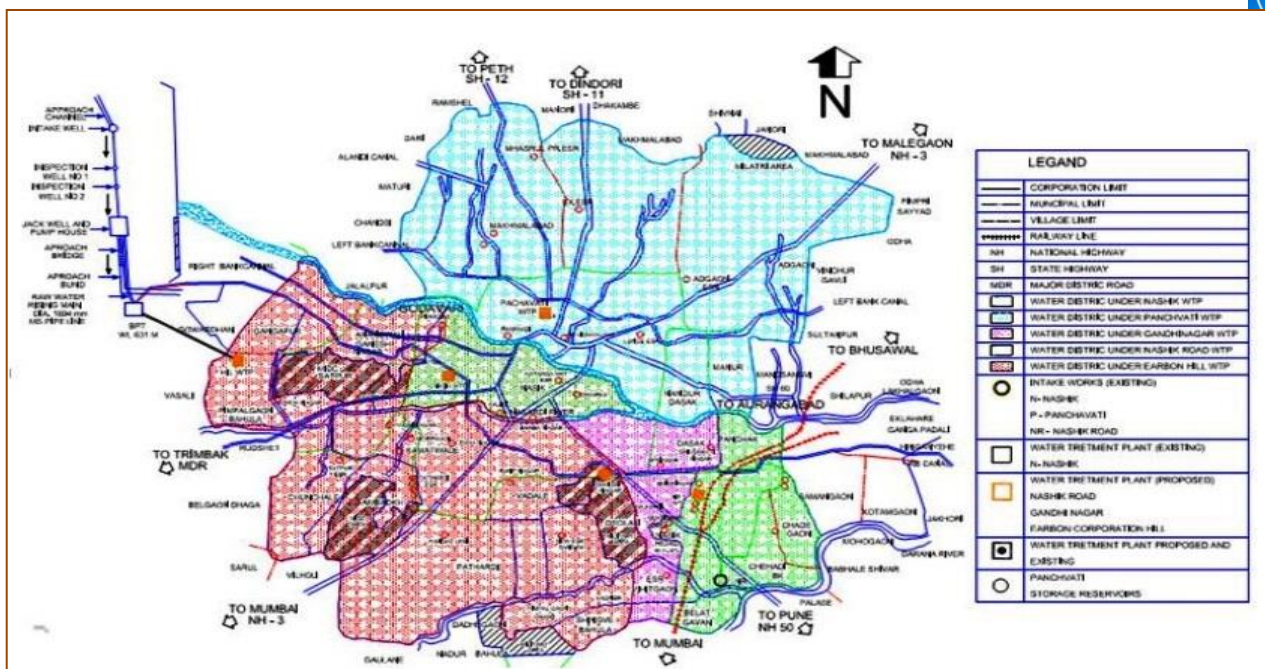


Fig 9.6 - Location of WTP and Water Supply Scheme of NMC area

Well set laboratory has been established for analyzing the quality of water, supplied to the citizens. Physical, chemical & biological analysis is carried out in the laboratory and analytical reports are consolidated. Information about water supply, current status of water supply and information towards water treatment plants are given in **Section 9.3, 9.4 respectively**.



Aeration Fountain



Clarifier Tank



Filter Bed



Water distribution tank

Use of Water is an index. The main objective of DPSIR is to indicate the coordination between water use and its availability. Due to this per capita water use, availability of water, quality, water rate, climate, water used by citizens (domestic use, drinking, bathing, cloth washing, or gardening) annual water consumption and percentage of water use is decided.

Table 9.6 - Information about potable water supply in NMC

Sr. No.	Particulars	Statistical details
1	Total Population (2011 census)	1486053
2	Total water supply per day	481.78 MLD
3	Average water supply- hours per day	2 to 3 hours /day

Source - Water Supply Department NMC

Conclusion

Water supplied to the citizens by Municipal Corporation is potable and of good quality as per the standards.

9.4 Water Supply Management

About 390 MLD from Gangapur Dam and 45 MLD from Darna River (Chehedi Barrage) are being lifted for daily water supply to the Nashik City. This water is purified at six water treatment plants. These water treatment plants are spread over 70 hectares of area and water is distributed to the Nashik city through 1400 kms pipeline network. Following are the details of water treatment plants available in Nashik City.



Table 9.7 - Water Treatment Plant and Their Capacities

Sr. No.	Name of Treatment Plant	Capacity
1.	Bara Bangla Water Treatment Plant	81 MLD
2.	Panchwati Water Treatment Plant	71 MLD
3.	Gandhinagar Water Treatment Plant	52 MLD
4.	Nashik Road Water Treatment Plant	73 MLD
5.	Shivaji Nagar (Satpur) Water Treatment Plant	145.5 MLD
6.	Nilgiri baug	50.00
	Total	472.50 MLD
7.	Old Pathardi Jakat Naka	137.00 MLD

Source:-Public Health Engg Dept NMC

The water supply currently being done in the city is being done on average 150 liters per person / day. Nashik city was selected with 63 cities in the country under the Jawaharlal Nehru National Urban Renewal Mission, to cater to the growing population of the Nashik city and the basic amenities required accordingly. Under this program, considering the future water demand of Nashik city, many detailed project reports were submitted to the Central Government. The Government of Maharashtra and the Central Government have sanctioned the City Development Plan of Nashik city and approved the plans for the city's future water supply. As per this plan, the city's future population and water demand are as follows.

Table 9.8 - Future Water Demand of Nashik City

Year	Population (Lakh)	Required Water Quantity (MLD)
2011	14.86	337
2021	26.00	500
2031	37.50	721
2041	52.50	1096



Table 9.9 - Laboratory analysis report of water supply department, NMC Nashik

Components (Name of test)													
Month	Turbidity		Hardness Mg/lit)		TDS (Mg/lit)		DO (Mg/lit.)		Fluorides (mg/lit)		MPN /100 ml		
IS BIS10400:2012	Max -5 NTU		Max 300		Max 500		Max 5 Mg/lit		Max mg/lit				
	Raw	Treated	Raw	Treated	Raw	Treated	Raw	Treated	Raw	Treated	Raw	Treated	
April 2019	2.14	1.13	04.00	104.00	87.00	172.00	NA	NA	NIL	NIL	NA	NA	
May 2019	0.86	0.14	16.00	104.00	81.00	160.00	NA	NA	NIL	NIL	NA	NA	
June 2019	5.64	2.13	96.00	96.00	58.00	137.00	NA	NA	NIL	NIL	NA	NA	
July 2019	4.97	2.28	04.00	104.00	73.00	142.00	NA	NA	NIL	NIL	NA	NA	
August 2019	249.00	3.48	56.00	56.00	23.00	101.00	NA	NA	NIL	NIL	NA	NA	
September 2019	68.30	3.96	80.00	80.00	67.00	141.00	NA	NA	NIL	NIL	NA	NA	
October 2019	22.80	2.69	64.00	64.00	18.00	101.00	NA	NA	NIL	NIL	NA	NA	
November 2019	0.46	0.47	64.00	64.00	10.00	102.00	NA	NA	NIL	NIL	NA	NA	
December 2019	0.26	0.12	00.00	100.00	82.00	174.00	NA	NA	NIL	NIL	NA	NA	
January 2020	0.27	0.16	00.00	100.00	90.00	181.00	NA	NA	NIL	NIL	NA	NA	
February 2020	1.27	0.14	76.00	76.00	69.00	161.00	NA	NA	NIL	NIL	NA	NA	
March 2020	1.54	0.50	84.00	76.00	65.00	158.00	NA	NA	NIL	NIL	NA	NA	

Source:-Public Health Engg Dept NMC

As mentioned above, Nashik Municipal Corporation started the planning for constructing required facilities to supply sufficient water to growing population. Under the Jawaharlal Nehru National Urban Renewal Mission, a project report worth Rs 50.52 crore (package-1) was approved for the water supply department and various works have been completed accordingly. Eg constructing new nine tanks, treatment plant capacity (48.5 + 26 MLD), rising main pipe line, putting ultra sonic flow meter at different locations, and distributing distribution channels of different diameters. Gangapur Dam (5630), Kashyapi (1861) and Gautami (1883), as per the Gangapur dam, total 9,400 mcm (million cubic meters) water is available. Similarly, Darna dam on Darna River and other dams on the tributaries have total capacity 15,663 mcm. If the population of 2041 is considered to be 52.50 lakhs for preparation of water supply report of Nashik city, the yearly water requirement is about 14113 mcm. For the purpose of the reservation of water for agricultural purpose, about 60% water (8467.80 mcm) is available after treating sewage in sewage treatment plant.

Thus, for the year 2041, considering the population of Nashik city Gangapur, Kashyapi and Gautami, will be reserved as per annual Water Demand.



9.5 Sewage Treatment Plant

The population of Nashik is 1486053 (2011 Census). As per Master Plan, based on topography of Nashik, the area is divided into eight sewerage zones (Fig: 9.5). Currently, there are 6 divisions (31 Wards as per 2011 Census). Total sewage generated in the city is properly treated in the STP and then released in the rivers. Godavari Action Plan and current works provided with 100% grant under National River Action Plan from Central Government. Nashik Corporation executed sewage pumping station and sewage treatment plant works in Nashik under Godavari Action Plan and JNNURM. The aggregate area of Nashik city is around 259 sq.km.

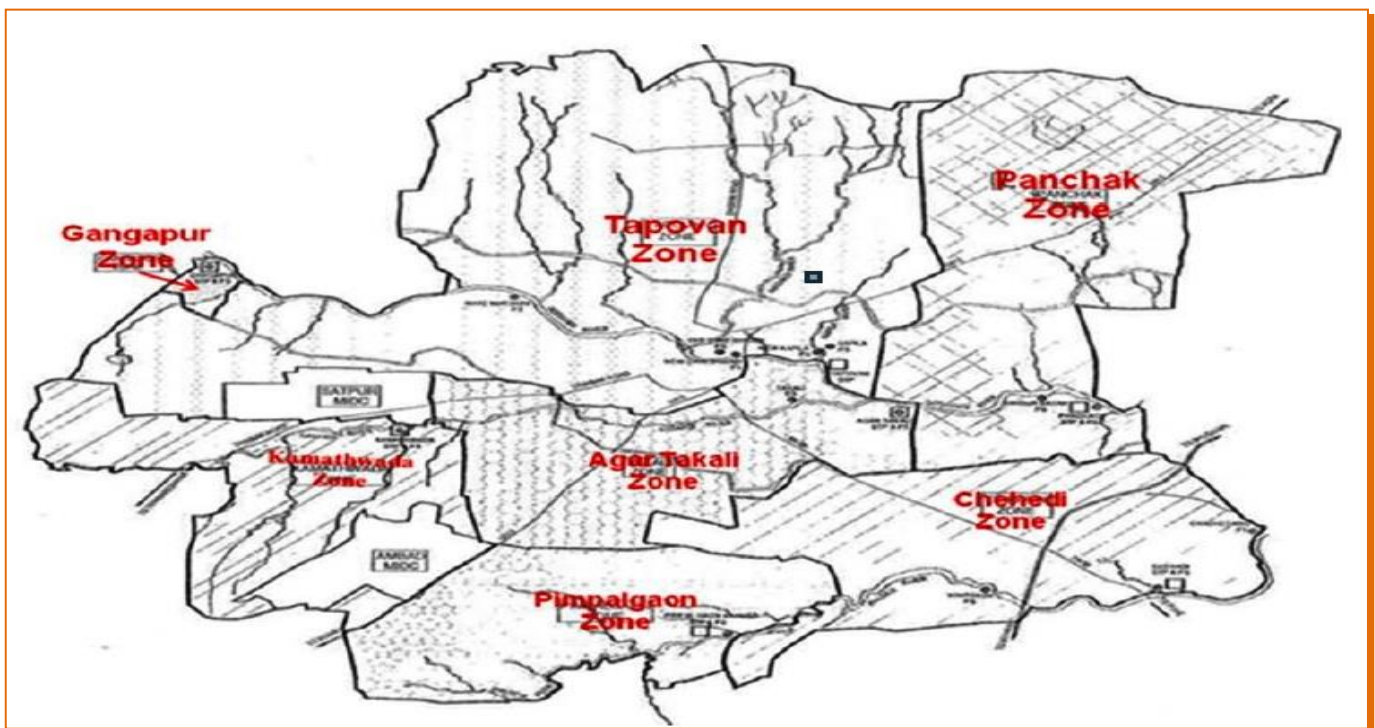


Fig. 9.7 - Service Zones of Sewerage System for Nashik City

Sewerage Network

Total sewage generated in Nashik city, is around 283 MLD, and is collected by sewer lines having a total length of 1585 km with variable diameters. Work for laying additional 210 km sewerage network is in progress. There are two waste water management system in Nashik i.e. off site sanitation (through sewage system) and onsite sanitation (through septic tanks and soak pits). NMC's sewerage system covers nearly 84% of its residential area. The town planning department has made septic tanks mandatory for getting building permissions in the city. About 80 to 85% of septic tanks and other individual toilets are connected to this network. These septic tanks are cleaned by the NMC on demand from the citizens.



In addition to the septic tanks, several households, located mainly in the New Nashik zone, have soak pits – which are lined pits without a floor and that allow human waste to filter through alluvial sand before reaching the underground aquifer. The outlets of septic tanks are connected to the sewer networks, and the sewage disposal in this system is done at the sewage treatment plant of the existing facility. Sludge collected from the septic tanks by the vacuum suction trucks is disposed in the sewage Treatment Plant.

Nashik has five operational Sewage Treatment Plant (STP) zones located at Tapovan, Chehedi, Agartakli, Panchak & Gangapur. The CPCB's nation-wide assessment graded Tapovan and Chehedi as satisfactory facilities and Panchak as a good facility. The operation & maintenance of the same is being executed through private contractors.

Table 9.10 - Various STP Capacities in Nashik City Area

Sr. No	STP	Capacity (MLD)	Method	Avg. Sewage Treated per Day in MLD
1	Tapovan Phase 1	78	UASB	124
2	Tapovan Phase 2 (New)	52	UASB	
3	Panchak Phase 1	7.5	ASP	24
4	Panchak Phase 2 (New)	21	ASP	
5	Panchak Phase 3	32	UASB	19
6	Chehadi Phase 1	20	ASP	42
7	Chehadi Phase 2	22	UASB	
8	Agar Takli Phase 1	70	ASP	67
9	Agar Takli Phase 2 (New)	40	UASB + MBR	29
10	Gangapur gaon	18	SBR	19
Total		360.5		324

Source: Environmental Engineering Department, NMC

Self-laboratory facility is available in plant and daily testing of treated sewage is carried out in all treatment plants.

Table 9.11 - STP Analysis Reports in 2019-2020

Sr. No	STP	Capacity (MLD)	Method	pH		TSS		BOD		COD	
				Max	Min	Max	Min	Max	Min	Max	Min
1	Tapovan Phase 1	78	UASB	7.55	7.31	29	15	20	14	64	44



2	Tapovan Phase 2 (New)	52	UASB	7.56	7.33	26	14	18	13	54	45
3	Panchak Phase 1	7.5	ASP	7.55	7.33	27	14	17	14	53	43
4	Panchak Phase 2 (New)	21	ASP	7.54	7.31	31	16	19	15	58	48
5	Panchak Phase 3	32	UASB	7.57	7.33	27	12	16	13	54	44
6	Chehadi Phase 1	20	ASP	7.41	7.23	23	10	16	10	39	30
7	Chehadi Phase 2	22	UASB	7.44	7.20	24	13	19	12	43	32
8	Agar Takli Phase 1	70	ASP	7.54	7.30	34	18	20	15	66	48
9	Agar Takli Phase 2 (New)	40	JASB + MBR	7.56	7.32	32	14	18	14	56	46
10	Gangapur Gaon	18	SBR	7.55	7.21	9	7	5	4	38	28

Source:-Public Health Engg. Dept NMC

Table 9.12 - Details of Power Generation through 100% Bio Gas at Tapovan STP in 2018-2019

Sr. No	Month	Avg. Sewage Treated per Day in MLD	Power Generate through 100% Biogas Engine Kw per hr	Power Generation through Water Kw per hr	MSEDCL Units
1	Apr-19	117.60	18940	NA	47600
2	May-19	111.46	17770		48990
3	Jun-19	109.02	19970		41865
4	Jul-19	112.26	14650		49975
5	Aug-19	106.43	4421		55575
6	Sep-19	136.63	6019		56550
7	Oct-19	133.42	4500		63318
8	Nov-19	127.84	5660		56450



9	Dec-19	117.83	9945		48225
10	Jan-20	120.90	17358		46478
11	Feb-20	126.59	11785		41833
12	Mar-20	120.09	17665		44065
	Total	1440.06	148683		600924
	Average	120.00	12390.25		50077

'Waste Water Treatment' is an index in DPSIR index method. The main objective behind, it is to minimize the water pollution in the city. The scope of carrying sewage water channels and the rate of treated sewage water are shown. Quality of Treated, waste water plays important role to determine treated sewage quality. A Good quality of sewage treatment facility is an index of good & developing society.



Tapovan STP



Agar Takli STP



Chehadi STP



Panchak STP

Fig 9.8 - Photographs of various STPs in NMC area

S-Status

Nashik city has a good infrastructure of Sewerage Network & Sewage Treatment Plants. The treatment quality of sewage is as per MPCB norms. In future, due to increased population & industrialization, water scarcity is certain. Therefore, use of different types of water conservation, recycling and rainwater harvesting methods are followed to increase the level of ground water.



I-Impact

Impacts of Water Pollution:-

i. Hazardous impacts of water pollution on human health

- A. Typhoid, diarrhea, gastro, hepatitis, jaundice, headaches and bowel disorder take place due to bacteria & viruses in stored water.
- B. Prevalence of diseases like cholera, hepatitis etc. due to infected water.

ii. Plants & animals

- A. Decrease of dissolved oxygen in polluted water affects aquatic fauna & flora.
- B. Photosynthesis process decreases due to floating oily substances on water.

R-Response

A master plan for sewerage system has been approved for the city. As per the expected population projection in 2041, eight sewerage zones are planned. Regular analysis on STP effluent water & Nallah water quality is done by the lab team. The river and their tributaries need special attention so as to identify and make the river boundary as tourist place by laying aside walkway, cycle way, green gym facility, etc., develop toilets, crematory & laundry (washing clothes) facilities separately along river boundary. Available (open) space on river side planted trees & garden developed. Different cultural and entertainment programs shall be conducted along the outer space on river.

Water Supply –

All over city 24 x 7 plans for implementation is being designed.



Chapter 10

Noise

10.0 Introduction

Noise Pollution or Noise disturbance is the excessive noise that may harm the activity or balance of human or animal life. Noise is indistinguishable from sound, as both are vibrations through a medium, such as air or water. Sound is measured based on the amplitude and frequency of a sound wave. Amplitude measures how forceful the wave is. The energy in a sound wave is measured in decibels (dB), the measure of loudness, or intensity of a sound; this measurement describes the amplitude of a sound wave. The main instrument to measure sounds in the air is the Sound Level Meter. The source of most outdoor noise worldwide is mainly machines and transportation systems, motor, vehicles, aircraft and trains. Outdoor noise is summarized by the word environmental noise.

D-Driving Force

1. Industrialization
2. Population growth
3. Change in lifestyle
4. Increased construction & townships
5. Modern lifestyle including excess use of Television, Telephone, Mobile, etc.

P-Pressure

1. Growth in number of vehicles resulting in congestion
2. Use of loudspeakers in functions, festival & speeches, etc.
3. Use of fire crackers in functions & other events
4. Population growth and change in standard of living leads to increase in number of vehicles causing increase in noise pollution. E.g. Honking
5. Rapid growth of construction activities increases noise levels



Noise Pollution mainly occurs due to use of equipments like mobiles, music system, and television etc. due to change in life style. It also occurs during Diwali, Dahihandi, Ganesh Visarjan and Navratri festivals.

During celebrations, musical instruments and noise making crackers are being used. So, during these festivals the noise pollution level is high. During Ganesh festival, Navratri and Diwali festival, noise levels at residential societies are observed well above the permissible limits.



Fig 10.1 - Noise Pollution during Ganesh & Diwali Festival

S-Status

10.1 Noise Status in Nashik city

Nashik City is divided into 4 zones viz., Residential, Commercial, Industrial and Silence zone. CPCB has specified the standards of noise levels during day and night times. Following



Table 10.1 shows standards for different zones, as per Noise pollution (Regulation and Control), Rules 2016.

Table 10.1 - Ambient Noise Quality Standards

Sr. No.	Category/ Area Zone	Limits in dB(A) Leq	
		Day (6 am to 10pm)	Night (10pm to 6 am)
1	Residential	55	45
2	Commercial	65	55
3	Industrial	75	70
4	Silence	50	40

Source: Central Pollution Control Board (CPCB)

If noise level is not meeting the norms, action is taken against concerned person by Police Department. As per rule 3 (1) and 4 (1) of Noise Pollution (Control and Regulation) Rules, 2000, Area within periphery of 100 meters of Courts, hospitals and educational institutions is declared as Silence Zone. Boards declaring Silence Zone have been installed and implementation of keeping silence zone is monitored by Police Department. Noise is measured by noise meter and expressed in units of decibel dB (A) Leq. Internationally accepted method is used for noise measurement.

10.2 Noise Monitoring in Nashik city

Noise monitoring stations selected covers residential, commercial, Industrial and silence zone. Ambient noise is measured for three times throughout the year and average results are given in table 10.2 and the obtained results are compared with the CPCB norms.



Table 10.2 - Average Noise Monitoring Results 2019 -20

Sr. No.	Name of the place	Day Time In Leq	Night Time In Leq	CPCB NORMS (Day time)	CPCB NORMS (Night time)
A	Residential				
1	Panchavati Karanja	68.2	57.4	55	45
2	Dwaraka	69.2	55.3		
B	Industrial				
3	Satpur MIDC	72.8	62.8	75	70
4	Ambad MIDC	70.6	61.2		
C	Commercial				
5	Main road	71.5	65.7	65	55
6	Trimbak Road ITI Signal	72.7	62.7		
7	Mumbai Naka	68.0	55.4		
8	Old CBS	73.8	62.1		
D	Silence				
9	Ashoka Medicover Hospital Indiranagar	48.5	32.2	50	40

Source: Green Envirosafe Engineers & Consultant Pvt. Ltd., Pune

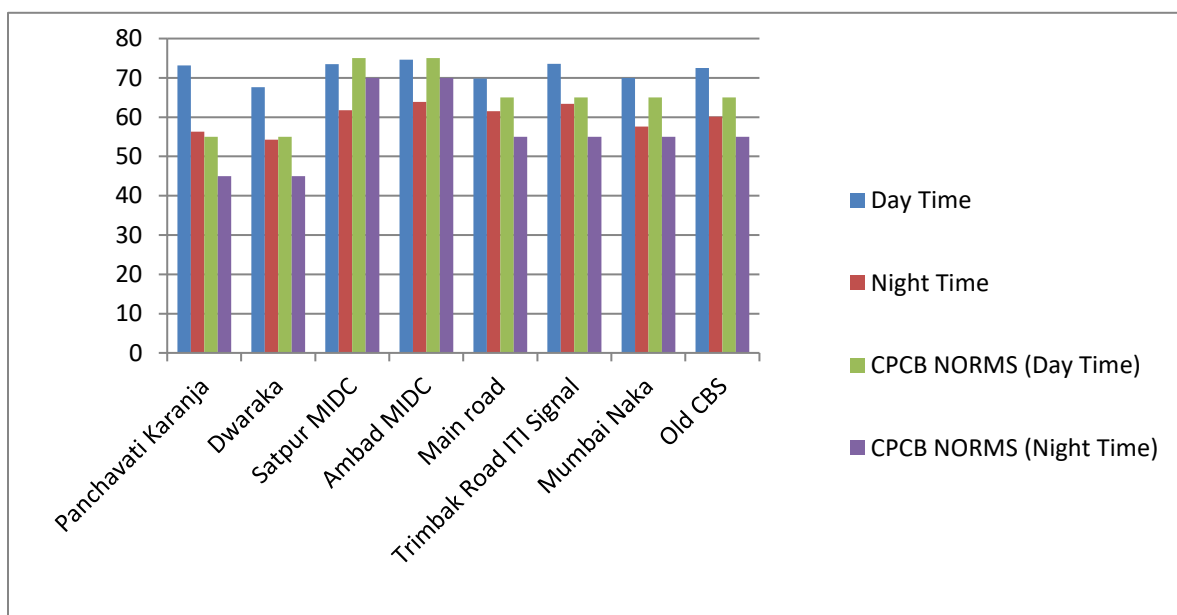


Fig 10.2 - Average Noise Monitoring 2019-20

Conclusion: All values of Residential, Commercial and silence zone exceeds the standard limit except industrial zone having values of noise within the standard limits.



Panchavati Karanja



Dwaraka



Satpur MIDC



Ambad MIDC



Main Road Trimbak Road



ITI signal



Mumbai Naka



Old CBS

Fig 10.3- Noise Monitoring Photographs at different locations



Table 10.3 - Noise Monitoring during Ganesh festival 2018.

Location of Noise Monitoring	Leq Night time (13 th Sept)	Leq Night time (14 th Sept)	Leq Night time (17 th Sept)	Leq Night time (19 th Sept)	Leq Night time (23 rd Sept)
Nashik Road/ Ramkund	76.7	82.8	76.7	80.2	103.6
Panchvati/ Near Ashok Stambh	76.4	76.4	76.4	80.5	105.0
Civil Hospital/ Near Gadge Maharaj Statue	78.1	80.1	78.1	82.4	102.5
Trimurty Chowk/ River bank of Waldevi	82.2	82.3	82.2	80.9	103.1
Satpur Bus Stand/ CIDCO (Behind PF Off.)	81.1	79.6	81.1	81.0	104.4

Source - MPCB website

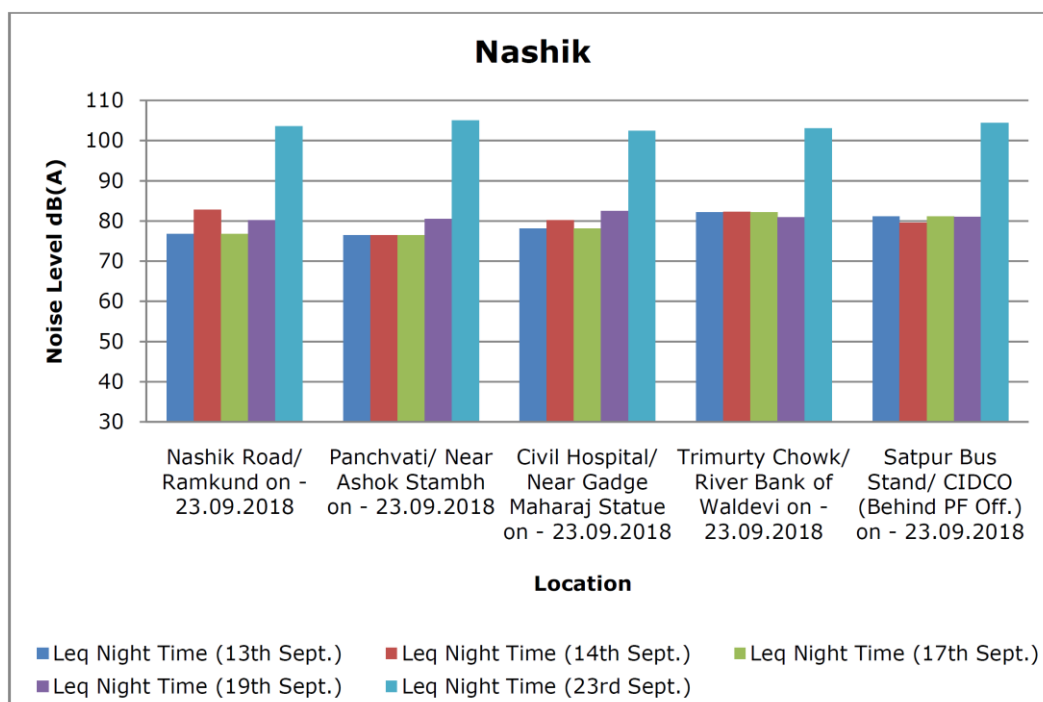


Fig 10.4- Noise Level during Ganesh Festival 2018



Table 10.4 - Noise Monitoring during Diwali festival 2018

Location	Day Time 7 th Nov	Night Time 7 th Nov	Day Time 9 th Nov	Night Time 9 th Nov
CBS	81.0	81.0	72.3	68.8
Panchavati	78.1	77.7	71.1	66.6
Dahipool	79.8	66.3	67.0	62.1
Cidco Residential	79.1	76.7	69.5	66.6
Bytco Chowk	78.9	71.4	68.1	67.1

Source – MPCB website

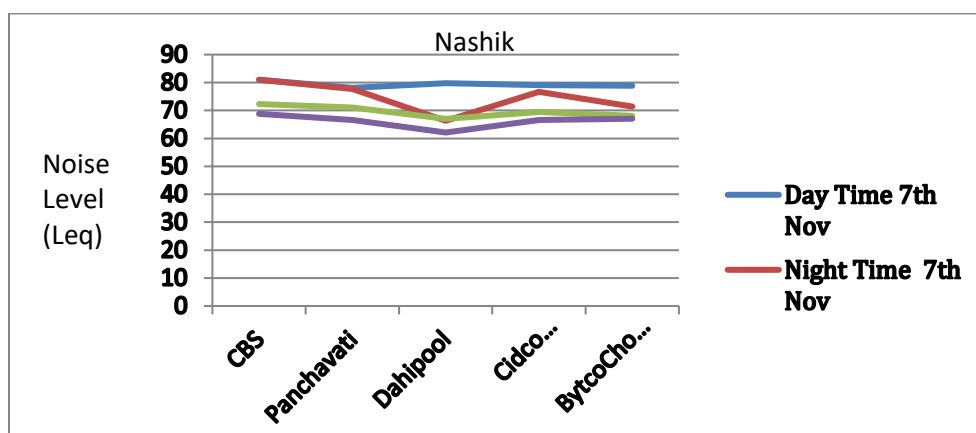


Fig 10.5 - Noise level During Diwali Festival 2018

Conclusion: The level of Noise is high and noise pollution is high as per the Ambient Noise quality standards. The highest noise level was observed on the first day during the noise monitoring at CBS both during day time and night time, with 81.0 dB(A).





Fig 10.6 - Noise pollution during Diwali Festival

Fire crackers contain hazardous chemicals and heavy metals like Aluminum, Sulphur dioxide, Potassium Nitrate, Barium etc., which have dangerous health impacts. Fancy fire crackers contain heavy metals like Copper, Cadmium, and Chromium to give colorful lights. After cracking, these heavy metals from crackers mix with dust and causes harm to humans, animals and vegetation.

Summary

The intensity of the noise in urban areas is growing day by day, caused due to industrialization, railways, aircrafts, vehicles as well as fireworks, speakers and DJ' systems.

Noise pollution by definition is wrong sound; these components may be in the wrong place and the wrong time for the next generation. Noise pollution is a silent killer producing unwanted energy and emotion that results in the person's body getting affected mentally and physically as well. Noise pollution also affects on the body of animal and vegetation. Noise pollution affects on living things. Noise pollution is growing due to industrialization and increasing number of vehicles.

Impacts on human health due to noise pollution

1. High sound levels above 100 dB lead to deafness.
2. Increased noise levels lead to enhanced blood pressure, lack in concentration, irritation, mental & physical imbalance.
3. Noise pollution may cause diseases like heart disease etc.
4. Noise also affects migration of birds & animals.
5. Noise pollution may adversely affect pregnant women.



6. Probable harmful impacts on human health by sound pollution at different levels are mentioned in **Table 10.5**.

Table 10.5 - Impact of Noise levels on human body

Sr. No.	Noise levels in dB	Health Hazards
1	80	Annoying
2	90	Pain in ear
3	95	Very annoying
4	110	Stimulation of skin
5	120-130	Pain threshold
6	130-135	Dizziness, vomiting
7	140	Pain in ear & Headache
8	150	Significant change in heart pulse rate

R - Response

1. It is necessary to raise noise barrier in construction zone at various places.
2. Complete ban on the bursting sound emitting fire crackers between 10 pm to 6 am.
3. Earliest action is being taken by Police department towards complaints on noise pollution by citizens.
4. Ban on the use of drums, trumpets and sound amplifiers between 10 pm to 6 am.
5. Since trees act as 'Noise Buffers', in 2018-19 NMC has planted nearly 21000 trees in various areas and across the roads.

Preventive Measures

1. Servicing of automobiles regularly.
2. Unnecessary use of horns should be avoided. Also use of multi tuned and loud horns should be avoided.
3. Avoid use of loudspeaker and such equipments making noise after 9 pm.
4. Switching off mobile phones in hospital and educational institutes.
5. School organization, Hospitals and areas surrounding Courts is considered under silence zone to control Noise pollution.



6. Avoid use of loud crackers and it should not be burst in residential area.
7. Provide sound proof chambers to the generator sets being used.
8. No honking in the city.
9. Implementation of the rules by Supreme Court to control noise pollution.
10. Report instances of violation of noise pollution norms to the Police Department.



Chapter 11

Solid Waste Management

11.0 Introduction

Solid waste management is a term that is used to define collection and treating solid waste. It likewise offers answers for reusing things that don't have a place with junk or waste. For as long as humans have been living in settlements and local locations, junk or solid waste has been an issue. Integrated Solid Waste Management is about how solid waste can be changed and utilized as a significant asset in a more systematic and holistic way. Solid waste administration ought to be understood by every last family including the entrepreneurs over the world. Industrialization has brought a great deal of good things and terrible things also. One of the negative impacts of industrialization is the formation of solid waste.

The scientific meaning is the collection, treating and disposal of solid material that is discarded because it has served its purpose or is no longer useful. Improper disposal of municipal solid waste can create unsanitary conditions and these conditions in turn can lead to pollution of the environment and to outbreaks of vector born disease i.e. diseases spread by rodents and insects.

Type of Solid waste:

A) Bio-degradable waste

It includes any organic matter in waste which can be broken down in to carbon dioxide, water, methane or simple organic molecules by microorganism and other living things using composting, aerobic digestion, anaerobic digestion or similar process. For example: Grass clippings, wastage of vegetables, kitchen waste, animal waste, dead animals, wood, etc.

B) Non - Biodegradable waste

Non-Biodegradable wastes are the type of waste that cannot breakdown or degrade for many years. This type of waste cannot change into manure and hence piles up causing pollution. Burning of these fuels causes more pollution in the environment. The non-biodegradable wastes



can become useful when they are recycled. Non Biodegradable waste can be divided into two subclasses:

B –1. Reuse/Recycle: Recycling is the method used to convert the waste materials into products which can be reused. The common waste materials which have the potential to be reused can be recycled as raw materials, can reduce energy consumption and need for waste disposal. Includes plastic, paper, glass, cloth, iron, rubber, etc. means this can be sold out to scrap dealer.

B – 2. Non-recyclable: Non-recyclable waste will end up at the dumping ground to be buried. It does not contain any of the recyclable waste because of prior sorting out. Wrapping, bags, Thermacol, tetra pack, water bottles, etc. This material is not purchased by anyone.

Various Grades of Solid Waste

1. Organic waste: Food, wet waste, vegetables etc.
2. Combustible: Paper, Wood, Grass Clippings, packed garbage etc. (High level organic and less wet ingredients).
3. Inflammable: Metal, alcoholic bottles, bottles, stones, etc.
4. Ash/Sand: Fine residues used for cooking.
5. Heavy solid waste: Branch of trees, tyres, etc.
6. Hazardous Waste: Oil, acid battery, medical waste, etc.
7. Construction waste: construction debris, soil, stones, etc.

Origin of Solid waste

1. Household waste: Vegetables, Fruits & other peels, clothes, plastic, other waste generated from home.
2. Agricultural Waste: Crops waste, spoiled fruits, leaves, tree trunk, etc.
3. Other: Companies waste material, dead animals, glass, waste furniture, industrial ash, etc.

Solid waste management has an important factor that is its classification.

4. It can be classified as below:

Solid waste classification

1. Wet Waste/ Biodegradable waste
2. Dry Waste/Non biodegradable waste



3. Reusable solid waste

Waste management or waste disposals are all the activities and actions required to manage waste from its inception to its final disposal. Waste management is not only collecting & incinerating by disposing off the waste. Waste management means to segregate waste, according to it reuse it or give a proper treatment and then dispose it. As per Municipal Solid Wastes (Management and Handling) Rules, 2016 waste classification is necessary and throwing waste on open site is banned.

D – Driving Force

1. Increasing population
2. Increasing no. of slums
3. Increasing industrial development in NMC area
4. Increasing solid waste during festival & occasion
5. Lack of waste classification

P – Pressure

1. Increased waste quantity due to Urbanization, Transportation, and Industrialization
2. Due to improper classification of waste
3. Increase of suspended particulate matter in Pandavleni and surrounding area
4. Various bacteria and growth of diseases from it
5. Increased quantity of solid waste
6. Difficulties during waste collection, segregation, transportation and disposal
7. Degradable and non-degradable waste should be collected together.

S - Status

11.1 Current Status of SWM in India

Every day 1.15 lakh tonnes per day solid waste is generated in urban areas in our country. Total waste generated in six mega cities is 21,000 TPD i.e. 18.35%, waste generated in metro cities 19,643 TPD i.e. 17.08%, waste generated in class one cities 42,635 TPD i.e. 37.07%.



Management of Solid Wastes is of growing concern to the general public at large, local authorities and Business communities in cities and towns across India.

The problem is exacerbating in urban areas due to rapid strides in population growth, coupled with an economic boom that encourages the Consumption of goods and, hence, wastes generation. If waste produced in all the class one cities is talked, total percentage of waste scientifically managed would be 72.5% of the total waste generated in India.

Reasons of Improper Management of Waste

- Improper planning for waste management while planning the townships.
- Impractical institutional set up for waste management and planning and designing in urban local bodies
- Lack of technical and trained manpower
- Incomplete community involvement
- Less expertise and exposure to the city waste management using modern techniques and best practices
- Partial awareness creation mechanism
- Outdated Management Information Systems
- Less funds with urban local bodies
- Indifferent attitudes of urban local bodies in user charges and sustainability

The Local Governing Bodies (LGBs), viz. municipalities and municipal corporations, are responsible for providing SWM services in the urban areas. In most of the urban areas, insufficient funds, use of obsolete/ inefficient technologies, lack of public awareness/training, and improper infrastructure have resulted in a state of poor SWM.



MSW – Municipal Solid Waste

MSW primarily comprises of 51% of Organic fraction, 17% of recyclables (paper, plastic and paper 32%) and inert material less than 1% of glass and metal (Report of Task Force on Waste to Energy). Currently India produces 42 million tons of MSW annually (200 to 600 gms per capita).

11.2 Initiatives to Improve SWM in India

In recent years, the Government of India has taken several initiatives to improve existing SWM Practices in the country. The solid waste policy in India specifies the duties and responsibilities for hygienic waste management for cities and citizens of India. The policy was framed in September 2000, based on the March 1999 Report of the Committee for solid waste management in Class 1 cities of India. Some of the key initiatives and recommendations are discussed below:

A) Honorable Supreme Court of India Recommendations

In recent years, the current SWM system in India has received considerable attention from the Central and State Governments and local municipalities. The first initiative was taken by the Honorable Supreme Court of India in 1994, which resulted in the formation of a Committee to study the current status of SWM in Indian cities. This Committee identified the deficiencies/gaps in the existing SWM system in the country and prepared the “Interim Report on SWM Practices in Class I Cities”. Class I are cities with a population ranging between one lakh to ten lakhs (1, 00,000 – 10, 00,000).

B) Municipal Solid Waste Management Rules

As a second initiative, the Ministry of Environment, Forests & Climate Change (MoEF & CC), Government of India, published “Municipal Solid Waste (Management and Handling) Rules 2000” (modified in 2016). These rules were developed in conformance with Sections 3, 6 and 25 of the Environment Protection Act, 1946 and aim at standardization and enforcement of SWM practices in the urban sector. According to Rule 4 of the MSW Rule 2000, (modified in



2016) every municipal authority is responsible for infrastructure for segregation and processing of municipal solid waste (commonly known as garbage).

They dictate that, “Every municipal authority shall, within the territorial area of the municipality, be responsible for the implementation of the provisions of these rules and infrastructure development for collection, storage segregation, transportation, processing and disposal of municipal solid wastes”. In addition, “the CPCB shall coordinate with State Pollution Control Boards (SPCBs) and Pollution Control Committees (PCCs) in the matters of MSW disposal and its management and handling”.

C) Jawaharlal Nehru National Urban Renewal Mission

The Jawaharlal Nehru National Urban Renewal Mission (JNNURM) was a massive city modernization scheme launched by GOI under Ministry of Urban Development. It envisaged a total investment of 20 billion dollar over seven years. JNNURM provided funding for urban infrastructure development in 63 cities and towns of the country. This mission was initiated in December 2005 and was continued until 2014. The scheme primarily incorporated two sub missions in to its program i.e. urban infrastructure and governance administered by Ministry of Urban Development with a focus on water supply and sanitation, solid waste management, road network, urban transport and redevelopment of old city area and development of basic services to the urban poor (BSUP) administered by the Ministry of Housing and Urban Poverty Alleviation with a focus on integrated development of slums.

D) Urban Infrastructure Development Scheme for Small and Medium towns

The primary objective of this scheme is to improve the urban infrastructure in towns and cities in a planned manner and to promote public-private partnership (PPP) in infrastructure development. This scheme was introduced in the year 2005-06 and was to continue for seven years. This scheme is applicable to all cities/towns as per 2001 census, except the cities/towns covered under the JNNURM. One of the components of this scheme is to renew the old sewerage and solid waste disposal systems in inner (old) areas.



E) Swatch Bharat Mission or Abhiyan

Swatch Bharat Mission (SBM) was launched on 2nd of October, 2014 with a vision to achieve a clean India as a tribute to the father of the nation, Mahatma Gandhi, on his 150th birth anniversary, in 2019.

The campaign in India that aims to clean up the streets, roads and infrastructure of Indian cities, smaller towns and rural area. The objectives of SBM include eliminating open defecation through the construction of household owned and community owned toilets and establishing an accountable mechanism of monitoring toilet use. Run by the GOI, the mission aims to achieve an open defecation free India up to 2nd October 2019.

SBM is being implemented by the Ministry of Urban Development (MoUD) and by the Ministry of Drinking Water and Sanitation (MoDWS) for urban and rural areas with a given set of guidelines for improved sanitary services and capacity building initiatives.

Municipal Solid Waste Management (MSWM) a major component of the SBM (urban)- “refers to a systematic process that comprises of waste segregation and storage at source, primary collection, secondary storage, transportation, secondary segregation, resource recovery, processing, treatment, and final disposal of solid waste.”

Under the provisions of SWM, the local bodies are to prepare Detailed Project Reports in consultation with the state government based on the identified needs of the City Sanitation Plans. Provision also mentions clustering of smaller cities for attracting Private investment. The DPRs should be prepared on lines with Govt. of India’s goals outlined in the NUSP 2008, SWM rules, advisories, CPHEEO manuals (including cost-recovery mechanisms), O&M practices and Service-level Benchmark advisories released by Mo UD and Manual on Municipal Solid Waste Management Rules, 2000 (modified in 2016).

F) National Green Tribunal Recommendations

Action plan for management of municipal solid waste (MSW) CPCB has framed and notified the Action plan for management of municipal solid waste (MSW) in compliance with the



National Green Tribunal order dated 5th Feb 2015 in the matter of OA No. 199 of 2014. The action plan emphasizes on strengthening the planning exercise at national, state as well as city Level by improvising through the waste management value chain. In addition to that, the plan suggested the concept of regional duster approach as well as technology options on the basis of quantum of MSW generation which has been re produced below in nutshell.

The Regional Cluster approach is based on the concept of discouraging setting up of individual waste processing and disposal facilities leading to mushrooming of innumerable facilities which are difficult to monitor and sustain. The approach requires a detailed survey of the study area and identification of location for regional facility with adequate size of land free from public objections. An indicative distance of say up to 50 km for each local body may be feasible based on local condition, fixing of criteria by the local body to transport the waste for common disposal point without causing public nuisance and traffic hurdles. However, alternate options can be worked out for smaller local bodies.

Common facility should be 'integrated' with facilities for sorting, compost, RDF and energy plant and followed by inert recycling/re-use. Only a fraction of inert waste should go for land-filling. The Action Plan has outlined indicative plan based on the quantum of waste generated in the cluster. The indicative plans have been given for towns/ cities in four ranges of waste generation.



Table 11.1- Indicative Plans for Municipal Solid Waste Management

Range	Plans of Treatment
>500TPD	Modernization/ mechanization of waste storage and transportation facilities Privatization/contract with operators for collection of waste from various sources and its transportation. Seeking support of private entrepreneurs for setting up for waste processing and disposal facility
Between 100-500 TPD	Modernization/ mechanization of waste storage and transportation facilities Privatization/contract with operators for collection of waste from various sources and its transportation. Seeking support of private entrepreneurs for setting up for waste processing and disposal facility
Less than 100 TPD	Proper system for waste collection, storage and transportation considering the local situation. Aerobic composting Such towns can be the member of cluster/Regional facility.
Less than 50TPD	Technological solutions which could be managed without high skill operations. Proper collection of waste and motivating citizens for segregation of waste Composting Such towns located near the Regional facility, should be the part of it.

Individual city has to establish its own waste processing plant and to provide its disposal facility it. So, due to these nearby surrounding areas has increased the number of processing plant whose care should be taken for further spam of time which is little bit expensive. Therefore, public establishment is better than individual establishment. For the public establishment, land survey should be taken done before used which should not be opposed by public, transportation point should be taken into consideration whose distance should be minimum 50 km local administration centre. Waste must be in solid form. Apart from these, smaller alternatives are needed to be found out.



11.3 Current Status of Solid waste Generation in NMC

Nashik city is governed by Municipal Corporation which comes under Nasik Metropolitan Region. The Nashik city is located in Maharashtra State of India. As per provisional reports of Census, the population of Nashik city in 2011 is 1,486,053. Accordingly, the population has reached to 14.86 lakh in 2011 and is estimated to reach 22.38 lakhs in 2021 and over 33.72 lakhs in 2031. The population annual average growth rate of the city is 3.09%, which is a healthy growth rate. NMC area is generating approximately 550 Metric Tons of solid wastes per Day (MTD).

A) Waste Collection

Nashik Municipal Corporation collects solid waste from door to door by Ghantagadis, small vehicles. Currently 550 MT solid wastes are collected every day in which approximately 50% is wet waste and 48% is dry waste.

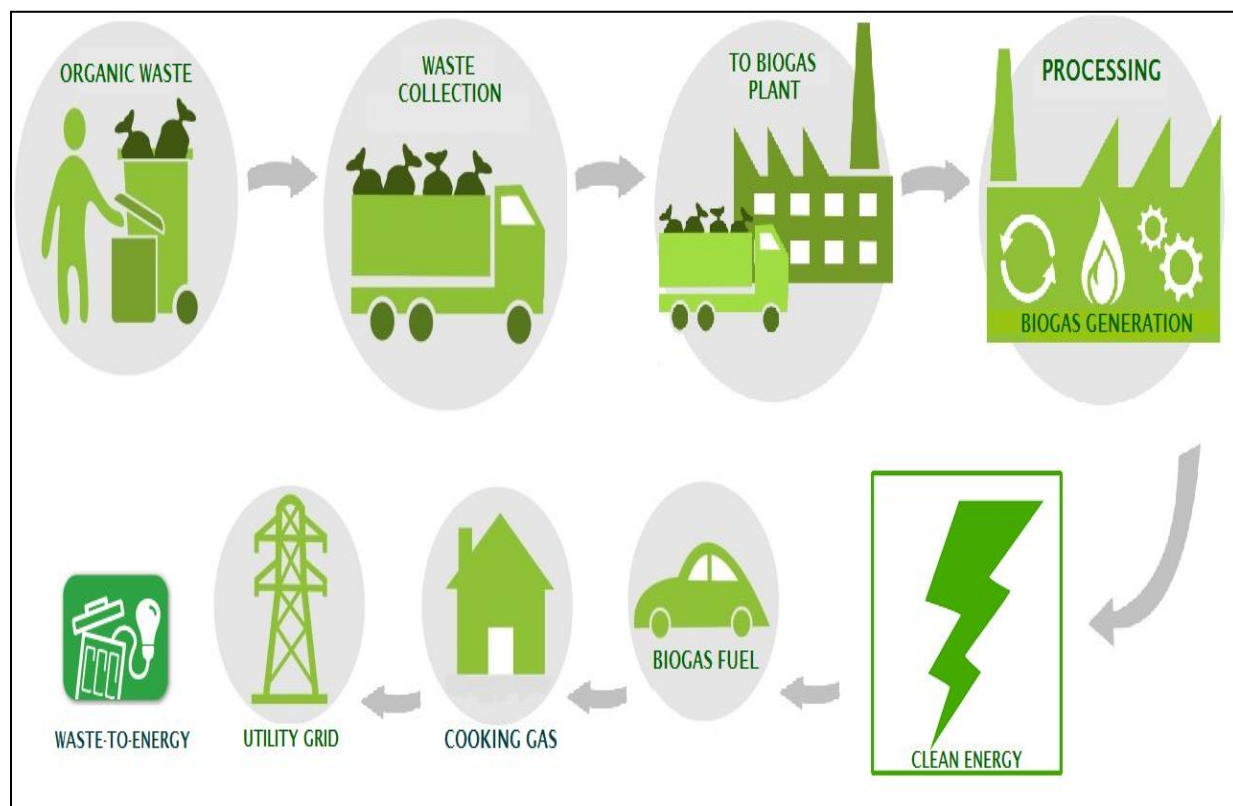


Fig 11.1- Solid Waste Management

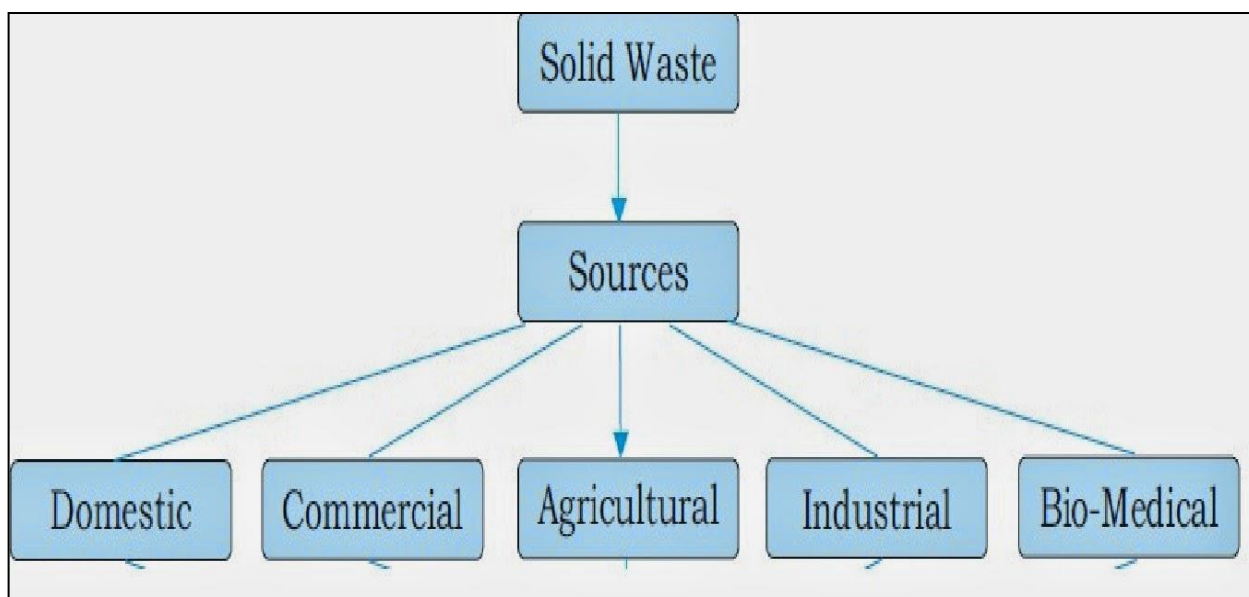


Fig 11.2- Sources of Municipal Solid Waste Generation

Waste is the end product of any process. The characteristics of waste vary at different sources of generation. It is important to identify these sources and incorporate in our study to understand the versatility of waste characteristic in a city. The sources are as follows.

Table 11.2 - Sources of Solid waste in NMC

Type of Establishment	Predominant waste
Residential	Biodegradable (Wet) Waste & Dry waste
Restaurant	Biodegradable & Non-Biodegradable (Dry) Waste
Wholesale & Retail Stores	Non-Biodegradable (Dry) Waste
Vegetable & Fruit Market	Biodegradable (Wet) Waste
Institutions	Non-Biodegradable (Dry) Waste
Industries	Biodegradable, Non-biodegradable, (Dry) waste (Ambad and Satpur MIDC)



Table 11.3- Current status of Solid waste generation in NMC

Sr. No.	Particulars	2019-20
1	Population of NMC Area (census 2011)	1,486,053
2	Total solid waste collection per day	550MT/day
3	Per capita quantity of solid waste generated metric ton per Day	300 gms
4	Percentage of segregation	Wet 52%, Dry 48%
5	Location of the solid waste processing site	Sr. No. 278, Pathardi Shivar, Behind Pandav Caves, Pathardi Phata, Nashik - 422010
6	Authorization for this site	Authorization No. BO/MSW/B-6253 dated 05/11/2011
7	Area of solid waste processing site (Sq.mt.)	32800
8	Distance from city to solid waste processing site (Km)	12 Km
9	Manpower required for management of waste	3452
10	No. of vehicles for management of solid waste	35 (use at composting project)
11	No. of vehicles (private /NGO'S)for handling waste	262 (solid waste collection)
12	Present mode of treatment disposal	Aerobic Composting Unit, Inert Processing Unit, Leachate Treatment Plant, Refuse Derived Fuel Plant, Animal Carcass Incinerator, Sanitary Landfill

B) Solid waste collection:

Waste from the roads is collected through sweeping while household waste is collected by door to door collection by 'Ghantagadi' with the help of the 2582 sweepers. Nashik is the only city in Maharashtra which has taken lead towards scientific management of MSW in abidance of MSW Rules 2000 & MSW Rules 2016. With the up gradation of entire SWM system, this facility could act as a lime light training and development center for the state of Maharashtra.

NMC has given contract of collection and transportation of solid waste of the 6 divisions and 31 wards to two contractors. Contract of collection and transportation includes door to door collection of solid wastes through Ghanta Gadies, and transportation to MSW treatment plant. Solid waste is collected from households of different wards of the city through 262 vehicles and ownership of the vehicle is with NMC.



Municipal Corporation has installed Nirmalya Kalash at various locations along with rivers for collecting Nirmalya from the city.

Table 11.4 - Average Characteristics of Fresh Municipal solid wastes

Sr. No.	Component	Proportion (kg)
A)	Biodegradable Waste	
1	Green Vegetable	38.14
2	Kitchen Waste	4.52
3	Slaughter House	3.76
4	Coconut Shell	3.10
5	Paper & Paper Products	2.63
Total		52.12
B)	Non-Biodegradable Waste	
1	Plastic & Plastic Products	12.06
2	Cloths, Cloth Products	7.90
3	Sand, debris, stones, etc.	16.48
4	Glass, crokeries, china pots	2.34
5	Rubber, tyre, tubes, etc.	1.06
6	Steel, aluminium, tin, copper, etc.	2.08
7	Leather, chappals, shoes, etc.	2.16
8	Synthetic, leather, etc.	2.18
	Handling Loss	1.62
Total		47.88

Source: SWM Department, NMC

C) Solid Waste Transportation

Waste is transported from the collection points to the landfill site near Pandav Leni Caves every day. Planned vehicles for transport of waste near Pandav Leni Caves with route cost optimization and time. The schedule of all vehicle prepared which includes time, capacity of bin, route and ward no. Also record of fuel, condition and maintenance of vehicle are carried out. Separate vehicles are assigned for hotel waste collection.

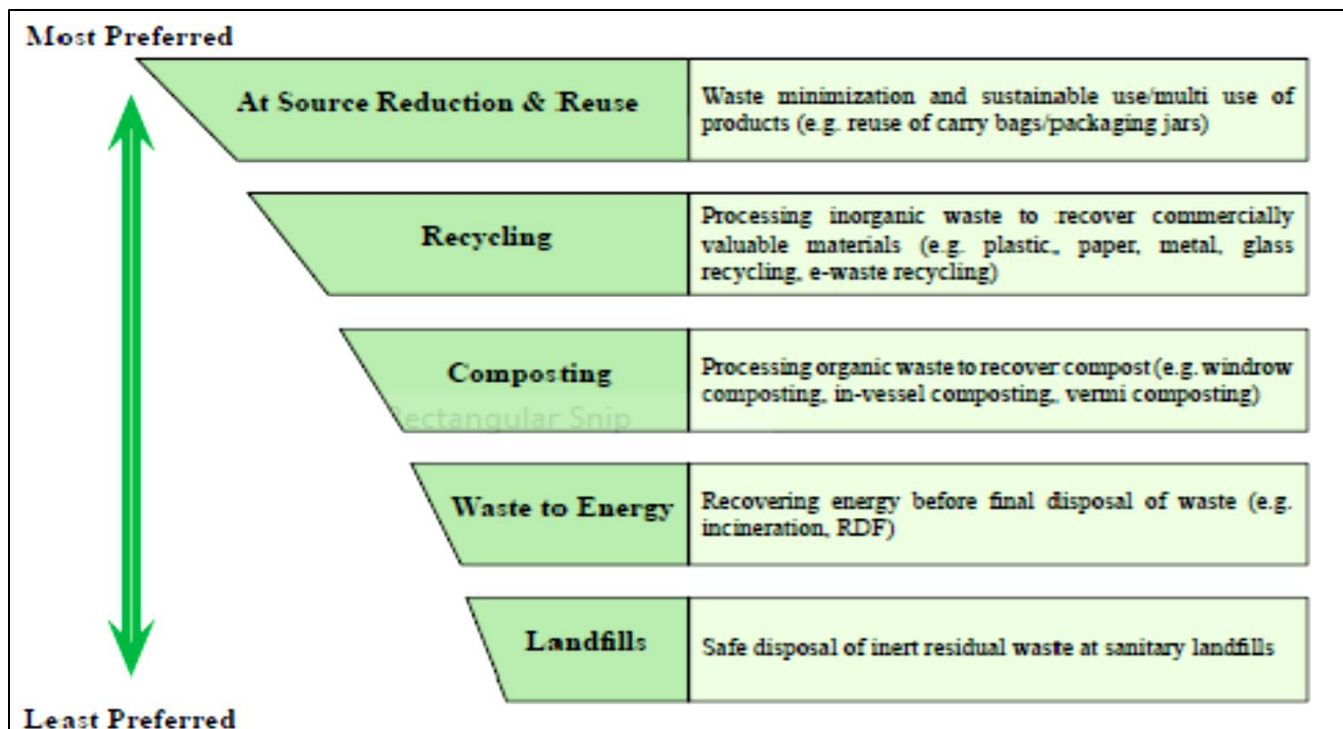


Fig 11.3 - MSW Management Practices

D) Solid waste Disposal (Treatment methods)

Integrated information about waste treatment plant installed in **Compost Plant** near Pandav Leni Caves by Municipal Corporation is presented in **Table 11.5**.

Table 11.5 - Showing particulars of various waste treatment plants of Compost Plant near Pandav Leni Caves

Sr. No.	Plant	Capacity(TPD)	Present treatment
1	Electro-mechanical Segregator	500 TPD	Average 500 MT
2	Composting Plant	500 TPD	Average Sludge 12 to 15TPD
3	Inert Processing Unit	50 TPD	Average 1.5 TPD (13 April to 14 March) fuel production 71,435 lit
4	Leachate Treatment Plant	0.4 MLD	Leachate treatment plant with capacity of 0.4 MLD leachate or 10 TPD organic wastes has been installed for treatment of leachate coming out from the windrows, the solid waste dumps and sanitary landfill site.
5	RDF Plant	150 TPD	RDF plant with capacity of 150 TPD is installed for generation of fuel pellets from high calorific value materials



6	Animal Carcass Incinerator	250 kg/h	Dead animal carcass incinerator with the capacity of 250Kg per hour is installed for the incineration of dead animals such as dogs, cattle's etc
7	Sanitary Landfill	2 Hector	All the necessary aspects of scientific land filling were considered during creation of sanitary landfill.

Source: SWM Department, (Manual on Solid Waste Management Plan for Nashik Municipal Corporation) NMC TPD – Tonnes per day.



Fig 11.4 - MSW Treatment Plant and Sanitary Landfill site at Compost Plant, Nashik

Proper arrangement for collection and transportation of leachate has been made. The leachate from the waste is also regularly treated & disposed of scientifically. As leachate is primarily generated in monsoon season and during other period, same plant is utilized for biogas generation from organic waste. 40 KW power is generated through the plant and utilized for operation of pumps at MSWM Facility. NMC is responsible for proper and scientific way of collection, segregation and disposal of municipal solid wastes within the limits of its jurisdiction, in compliance with:

- ✚ Environment Protection Act 1986
- ✚ Government of India Municipal Solid Waste (Management and Handling) Rules 2000 & Solid Waste (Management and Handling) Rules 2016.



Compost Plant near Pandav Leni Caves, Nashik

Pre-sorting Unit

It is electro-mechanical segregation system for incoming non segregated MSW with the capacity of 500 TPD and it comprises of two lines with all necessary requirements and materials. After mechanical segregation compostable material will go to windrow composting, material with calorific value goes to RDF plant and inert will be further processed at Inert Processing plant.



Aerobic Composting Unit

Composting is done through windrow composting method and sheds have been constructed for windrows. Today out of total MSW 3% to 5 % is converted into compost. The compost has already become popular amongst the farmers within 100 km radius of Nashik. Once segregation at source will be increased, then the quantity of generation of compost will increase up to 10% to 15 % of total MSW. The Compost Plant has been given on PPP basis for operation.

Inert processing unit

Inert processing unit, with a capacity of 50 TPD, comprises of mechanical sieve and air density separator. Main purpose of inert processing plant is to recover the construction material from the waste and to recycle it by selling or utilizing it for in-house construction activities. This is mainly to minimize landfill burden on O&M cost and also saving of land.

Leachate treatment plant

Leachate treatment plant with capacity of 0.4 MLD leachate has been installed for treatment of leachate coming out from the windrows, the solid waste dumps and sanitary landfill site. Proper arrangement for collection and transportation of leachate has been made. As leachate is primarily generated in monsoon season and during other period, same plant is utilized for bio gas generation from organic waste. 40 KW power is generated through the plant and utilized for operation of pumps at MSWM facility.

Refuse Derived Fuel (RDF) Plant

The high calorific energy containing materials present in MSW are to be handled separately from the stage of receiving at the tipping floor onwards. RDF plant with capacity of 150 TPD is installed for generation of fuel pellets from high calorific value materials. Woody materials, paper products, textiles, jute etc forms the main constituents of RDF which is a valuable source of alternate energy. The technology for RDF primarily focuses on refinement of MSW through material re-combinations, segregation, drying, size reduction, blending and homogenization. This material is further refined for separation of sand, dust, metals, glass etc before grinding or shredding. The shredded material is obtained as fluff (<2 cm size) which is



further processed into pellets, briquettes or bailing. NMC is exploring the possibilities for marketing of fuel pellets and nearby industries have shown their interest for fuel pellets.

Animal Carcass Incinerator

Dead animal's carcass incinerator with the capacity of 250 kg per hour is installed for the incineration of dead animals such as dogs, cattle etc.

Sanitary landfill

The solid waste that is not suitable for any processing is transported to the sanitary landfill site. For this purpose, a sanitary landfill in an area of 2 hector has been developed. All the necessary aspects of scientific land filling were considered during creation of sanitary landfill. Proper arrangement for leachate is also provided and this is connected to the leachate treatment plant for further processing.

Details of solid waste disposal in Compost Plant are documented in **Table 11.7 to 11.13**. Analytical reports of composts, capping soil, pit soils, air qualities, and fertilizer values of wastes and surface & ground water characters of the areas in and around Compost Plant, Near Pandav Leni Caves are presented in **Tables**.



Sanitary Landfill



Table 11.6 (i) - Solid waste disposal in SWM Plant, Near Pandav Leni Caves during 2017 -18

Sr. No.	Month	Waste Received	Compost Production	RDF Production	Reject (MT)
1	April 17	13721.61	650.00	850.00	2607.11
2	May 17	14845.38	752.76	752.00	2720.50
3	June 17	16672.72	257.48	295.00	3042.10
4	July 17	15947.795	425.55	425.55	3030.08
5	August 17	15621.115	312.00	437.00	2960.20
6	September 17	18050	181.75	411.00	3429.50
7	October 17	17487.92	163.00	300.00	3022.32
8	November 17	14584.209	221.48	1009.00	2731.50
9	December 17	15466.6	1051.62	988.00	2938.65
10	January 18	14687.505	717.51	1090.00	2790.63
11	February 18	13907.075	1082.00	700.00	2642.34
12	March 18	16022.87	1150.50	881.00	3014.20
Total (MT)		187014.799	6965.64	8138.55	34929.13

Source: SWM Department, NMC

Table 11.6 (ii) - Solid waste disposal in SWM Plant, Near Pandav Leni Caves during 2018 - 19

Sr. No.	Month	Waste received	Compost production	RDF production	Reject (MT)
1	April 18	15786.79	1291.00	1180.00	2754.93
2	May 18	16389.875	1080.00	1198.00	2556.18
3	June 18	17767.485	950.00	1099.00	2632.64
4	July 18	17962.608	632.50	577.00	3083.53
5	August 18	17959.695	909.30	1436.60	3609.28
6	September 18	17403.405	1044.20	1392.3	3300.82
7	October 18	18142.941	1088.58	1451.40	3418.40
8	November 18	16593.725	995.60	1327.50	3071.10
9	December 18	16694.595	1003.68	1383.50	3019.75
10	January 19	16786.84	1120.00	1342.90	3064.10
11	February 19	15106.35	1289.00	1208.50	2750.50
12	March 19	16659.67	1609.00	1332.10	3069.20
Total (MT)		203253.98	13012.86	14928.80	36330.43

Source: SWM Department, NMC



Table 11.7- Physico-chemical properties of Manure, city compost of the pit in SWM Plant, Near Pandav Leni Caves in 2019-2020

i. Manure analysis Report of fresh MSW

Sr. No.	Parameter	Result	Unit	Standard Method
Physical Parameter				
1	Moisture content	36.75	Percent (%)	IS:2720
Chemical Parameter				
1	Organic matter	51	percent	C.A. Black, American Society of Agronomy 5th Edition , 65-15800
2	Total Nitrogen	11,427.102	mg/kg	IS :14684:1999(R.A. 2005)
3	C:N ratio*	38.59	-	-
Elemental Testing				
1	Potassium (as K)	1735	mg/kg	APHA (Edition 22nd) 3120 B
2	Phosphorous (as P2O5)	2274.05	mg/kg	APHA (Edition 22nd) 3120 B

Source: SWM Department, NMC

Table 11.8 - Manure Analysis Report of RDF MSW

Sr. No.	Parameter	Result	Unit	Standard Method
Physical Parameter				
1	Moisture content	29.37	percent	IS:2720
Chemical Parameter				
1	Organic matter	33.46	percent	C.A. Black, American Society of Agronomy 5th Edition , 65-15800
2	Total Nitrogen	3562.43	mg/kg	IS :14684:1999(R.A. 2005)
3	C:N ratio*	26.35	-	-
4	Calorific value	3056.85	Cal/gm	IS:1350 part 1 19114
Elemental Testing				
1	Potassium (as K)	5232.36	mg/kg	APHA (Edition 22nd) 3120 B
2	Phosphorous (as P2O5)	352.82	mg/kg	APHA (Edition 22nd) 3120 B

Source: SWM Department, NMC



Table 11.9 - Analysis of City Compost at SWM Plant, Near Pandav Leni Caves 2019-20

Sr. No.	Specification as per FCO	Composition as per Analysis (in %)
A	Physical Characteristics	
	1. Moisture	19.56
	2. A. Particle Size: + 4.00 mm	0
	2. B. Particle Size: + 4.00 mm	100
	3. Bulk Density (gm/cm ³)	1.00
B	Chemical Characteristics	
	1. Total Organic Carbon	19.87
	2. Total Nitrogen	1.02
	3. Total Phosphate P ₂ O ₅	0.98
	4. Potash	0.51
	5. C:N Ratio	19.44
	6. pH	7.17
C	Heavy Metals	
	1. Zinc (as Zn) mg/kg	48.64
	2. Cadmium (as Cd) mg/kg	0.01
	3. Lead (as Pb) mg/kg	0.04
	4. Copper (as Cu) mg/kg	0.02

Source: SWM Department, NMC

Table 11.10 - Analysis of Leachate at SWM Plant, Near Pandav Leni Caves- 2019-20

Sr. No.	Parameter	Leachate-I Raw	Leachate 2 Treated	Leachate After Primary Treatment	Leachate Raw	Unit
1	TSS	1045	606	534	1463	mg/lit
2	TDS	14816	9736	10092	22386	mg/lit
1	pH	7.09	7.72	6.96	5.2	--
2	BOD	9000	1200	2300	19000	mg/lit
3	COD	32500	4166.67	8056.68	68825.91	mg/lit
4	Chlorides as Cl	4312.39	2695.24	2278.1	5439.49	mg/lit
5	Phenol *	75	515.04	32.99	355.7	mg/lit
6	Ammonical Nitrogen	1265.96	320.21	51.8	133	mg/lit
7	Total Kjeldahl Nitrogen	1929.2	608.44	525	2170	mg/lit
11	Fluoride as F *	16.89	2.16	0.505	1.82	mg/lit
9	Arsenic as As*	0.01	0.001	1.99	2.29	mg/lit
10	Mercury as Hg*	BDL	BDL	1.5	1.1	mg/lit



11	Lead as Pb*	0.01	0.003	<0.10	<0.10	mg/lit
12	Cadmium as Cd*	BDL	BDL	<0.10	<0.10	mg/lit
13	Chromium as Cr*	0.31	0.22	0.31	0.52	mg/lit
14	Copper as Cu	0.02	0.003	<0.10	<0.10	mg/lit
15	Zinc as Zn	0.23	0.17	0.18	2.29	mg/lit
16	Nickel as Ni	0.23	0.17	0.19	0.32	mg/lit

Source: SWM Department, NMC

BDL - Below Detectable Level

**Table 11.11 - Ground water qualities in and around SWM Plant, near Pandav Leni Caves-
Average 2019-20**

Sr. No.	Parameter	Ground water	Unit
1	Phenol*	Nil	mg/lit
2	Ammonical Nitrogen	0.28	mg/lit
3	Total Kjeldahl Nitrogen	0.84	mg/lit
4	Fluoride as F *	0.11	mg/lit
5	Arsenic as As*	0.03	--
6	Mercury as Hg*	0.03	mg/lit
7	Lead as Pb*	<0.10	mg/lit
11	Cadmium as Cd*	<0.10	mg/lit
9	Chromium as Cr*	<0.10	mg/lit
10	Copper as Cu	<0.10	mg/lit
11	Zinc as Zn	<0.10	mg/lit
12	Nickel as Ni	<0.10	mg/lit

Source: SWM Department, NMC

**Table 11.12 - Surface Nala and Surface pond water qualities in and around SWM Plant,
near Pandav Leni Caves - Average 2019-20**

Sr. No.	Parameter (mg/lit)	Surface Nala water	Surface Water Pond	Std. IS10500:2012
1	Phenol*	7.16	Nil	--
2	Ammonical Nitrogen	3.52	0.56	--
4	Fluoride as F *	0.525	0.09	--
5	Sulphate as P *	0.6	13.8	200



6	Nitrate as NO ₃ *	<0.10	1.45	45
7	Arsenic as As*	<0.10	<0.10	0.05
8	Mercury as Hg*	<0.10	<0.10	0.001
9	Lead as Pb*	0.03	0.02	0.05
10	Cadmium as Cd*	<0.10	<0.10	0.01
11	Chromium as Cr*	0.05	<0.01	0.05
12	Copper as Cu	<0.10	<0.10	0.05
13	Zinc as Zn	<0.10	<0.10	5.0
14	Nickel as Ni	0.13	<0.10	--

Source: SWM Department, NMC

Conclusion - From above table it is observed that results of some hazardous chemicals have exceeded standard limits.

E) Biomedical Waste Management

Table 11.13- Average Annual Air quality testing report at SWM Plant, near Pandav Leni Caves

Sr. No.	Parameter	Near ETP	Near Main Gate	Unit	NAAQ Standards (µg/ M3)
1	Ambient Temperature	30.25	30.3	0 C	
2	Dry Bulb Temperature	29.75	30	0 C	
3	Wet Bulb Temperature	23	22.3	0 C	
4	Relative Humidity	48	49	% RH	
5	Sampling Duration	1440	1440	Min	
6	Sulphur Dioxides (So ₂)	23.18	19.26	µg/m ³	80
7	Oxides of Nitrogen (No ₂)	36.54	25.32	µg/m ³	80
8	Particulate Matter PM 10	36.54	59.55	µg/m ³	100
9	Particulate Matter PM 2.5	25.26	23.29	µg/m ³	60
10	Ozone (O ₃)	13.24	15.52	µg/m ³	180
11	Lead (Pb)	BDL	BDL	µg/m ³	1.0
12	Carbon Monoxide(CO)	0.33	0.43	mg/m ³	04
13	Ammonia (NH ₃)	BDL	BDL	µg/m ³	400
14	Benzene (C ₆ H ₆)	BDL	BDL	µg/m ³	05
15	Benzo (a) Pyrene (BaP)	BDL	BDL	ng/m ³	01
16	Arsenic (As)	BDL	BDL	ng/m ³	06
17	Nickel (Ni)	BDL	BDL	ng/m ³	20

Source: SWM Department, NMC



According to Biomedical Waste (Management and Handling) Rules, 2016 of India “Any waste which is generated during the diagnosis, treatment or immunization of human beings or animals or in research activities pertaining thereto or in the production or testing of biological. The GOI Notification, 1998 specifies that hospital waste management is a part of hospital hygiene and maintenance activities. This involves management of range of activities, which are mainly engineering functions, such as collection, transportation, operation or treatment of processing systems, and disposal of wastes. One of India’s major achievements has been to change the attitudes of the operators of health care facilities to incorporate good HCW management practices in their daily operations and to purchase on-site waste management services from the private sector. World Health Organization states that 85% of hospital wastes are actually non-hazardous, whereas 10% are infectious and 5% are non-infectious but they are included in hazardous wastes. About 15% to 35% of Hospital waste is regulated as infectious waste. This range is dependent on the total amount of waste generated.

The World Health Organization (WHO) has classified medical waste in to eight categories as

Category No. 1: Human Anatomical Waste

Category No. 2: Animal Waste

Category No. 3: Microbiology & Biotechnology Waste

Category No. 4: Waste Sharps

Category No 5: Discarded Medicines and Cytotoxic Drugs

Category No 6 Soiled Waste (Item Contaminated with Blood and Body Fluids)

Category No 7 Infectious Solid Waste

Category No 8: Liquid Waste

Category No 9: Incineration Ash

Category No 10: Chemical Waste

In general Biomedical Waste consists of

- Human anatomical waste like tissues, organs and body parts
- Animal wastes generated during research from veterinary hospitals
- Microbiology and biotechnology wastes
- Waste sharps like hypodermic needles, syringes, scalpels and broken glass



- Discarded medicines and cytotoxic drugs
- Soiled waste such as dressing, bandages, plaster casts, material contaminated with blood, tubes and catheters
- Liquid waste from any of the infected areas
- Incineration ash and other chemical wastes

Legal aspect

The Central Government, to perform its functions effectively as contemplated under sections 6, 8, and 25 of the Environment Protection Act, 1986, has made various Rules,

Notifications and Orders including the Bio-medical wastes (Management & Handling) Rules, 1998.

A brief summary of the provisions in Bio-medical wastes (Management & Handling) Rules, 1998 is given below.

- Section 3 establishes the authority of the government to undertake various steps for protection and improvement of the environment.
- Section 5 provides for issuance of directions in writing.
- Section 6 empowers the government to make rules.
- Section 8 permits the education of individuals dealing with hazardous wastes regarding various safety measures.
- Section 10 bestows authority to enter the premises and inspect.
- Section 15 allows the government to take punitive steps against defaulters. This involves imprisonment up to five years or penalty of upto rupees one lakh or both. In case the default continues, it would then attract a penalty of rupees five thousand per day up to one year and thereafter imprisonment up to seven years.
- Section 17 provides for punishment in case of violations by government departments.



Table 11.14- Medical facilities available in Nashik Municipal Corporation Area

Sr. No	Type of Medical Establishment	Nos.
1	Total no. of beds available	8533
2	Private nursing homes , Maternity & Hospitals	571
3	NMC Hospitals	04
4	Municipal nursing homes	05
5	Dispensaries & City primary health center	30
6	Mobile dispensaries	00
7	Sonography centers	5 govt. 309 private
8	Govt. hospitals	02
9	ESIC hospitals	01
10	ISP hospitals	01
11	Immunization center	182
12	AIDS center	01
13	Gov. Recognized MTP center	123
14	Family planning centers	07
15	Leprosy unit	01
16	Leprosy center	11

Source: Health Department, NMC

In Nashik, Watergrace Products provide facilities of Biomedical Collection, Transportation, Segregation and disposal. Since last 15 years M/S Watergrace Products provide this facility for Nashik District. They collect biomedical waste by visiting door to door in municipal corporation area. All the necessary setups of common biomedical waste collection,



transportation, treatment and disposal facilities are available with them. They provide treatment as per MPCB and CPCB norms.

Table 11.15- Details of Biomedical Waste and Quantity of Bio medical waste generation

S. No	Details	2019-2020
1	Total Bio Medical waste generated in (kg)	700 tonnes
2	Process treatment of Bio Medical waste	Common Bio Medical Waste Treatment Facility
3	Total nos. of collection center for Bio Medical waste from Health Care Establishment's Nashik city	1675
4	Total nos. of disposal units for Bio Medical waste	1
5	How much waste is treated out of total generation of Bio Medical waste	700 tonnes
6	No. of vehicles is used for collection of Bio Medical waste	8
7	No. of collection center of Bio Medical waste	1675
8	Total no. of beds covered	11085
9	Use of solar energy (fan, light etc.)	NO
10	STP/ETP plant is established or not?	YES - ETP
11	Quantity of recycle water	5000 Ltr./day

Source - Health Department, NMC

Hazardous waste

Nashik city has two MIDC areas namely Ambad and Satpur. There are number of Industries, out of which few industries are of Red categories which generate Hazardous waste. The industries which generate hazardous waste come under Red category as per the CPCB norms. The industries have to follow the Hazardous & Other Wastes (Management & Tran boundary) Rules 2016. Industries which generate the hazardous waste have to take the membership from authorized company. MIDC is constructing a CETP Plant in MIDC Area in Ambad.

Summary

Initiatives to be taken for Integrated Solid Waste Management in NMC:



In general Municipal Corporations or ULB's mostly suffer from lack of funds and man power to perform the required functions. Moreover, with increasing urbanization and rate of solid waste generation, the burden has also magnified. The MSW Rules, 2000 (modified in 2016) have set responsibilities for ULBs, State governments and Central & State pollution control boards for different aspects of MSW management. These rules make ULB's responsible for their implementation and for any other infrastructure development pertaining to collection, storage, segregation, transportation, processing and disposal of municipal solid waste.

Information, Education and Communication Strategy (IEC) :

Identification and selection of target groups plays a key role in creating effective awareness in residents. For solid waste management, it becomes more important as the source of MSW starts from houses due to which target starts from household female head, youths and children who require some form of role model or different methods to influence their behavior. It is a very important aspect which starts from waste generators level and may reduce, reuse and recycle their waste. There is a significant increase in the aspect of segregation of waste in Nashik City.

A) *Environment Education:*

Education becomes the next significant factor in creating public awareness. It requires people to have basic understanding in waste management project activities. They will be briefed on various aspects of MSW system right from its generation to disposal. The education would also disseminate them with ideas such as why it needs to be discussed at such big platform, what will be the benefits of processing it scientifically and why if not treated properly; it can lead to havoc in coming years. This component shall help in bringing citizens together from various walks of life such as students, NGOs, intellectual class and teachers etc.

They can share a platform to partner with the authorities who are engaged in waste treatment technologies so that system shows high level of efficiency and effectiveness.





B) Communication

Communication is an integral part of planning for sustainable development. The development of human society is largely because of its ability to communicate information and ideas with each other and to use such information and ideas for progress. The approach of NMC campaigns, programs should be to emphasize on communication with target groups, local community for the implementing programme of Solid Waste Management in respective areas.

NMC imposes

- Penalties on the waste generator if the segregated waste is not provided to the waste collector.
- Penalties on the waste generator if two bin system are not followed.
- Penalties on littering of waste on the roads.
- Negative publicity of the waste generators in the case of default.

To create awareness and promote adoption of desired behaviors in all stakeholders, a phase-wise approach will be followed.





C) Grievances Cell Establishment

To strengthen the service delivery system, a grievance registering mechanism has been developed in the NMC where general public can register a grievance in case of poor waste management, garbage disposal, etc.

11.4 Special Initiatives of NMC

- ❖ Helpline – Information dissemination and grievance redressal system
- ❖ Citizen's Charter
- ❖ Corporation's Web Portal (<http://nashikcorporation.gov.in>)
- ❖ 45 Online Services
- ❖ Online Development Plan & Part plan / Zoning Certificate
- ❖ Online Building Permission with Auto DCR System.

i) Information about Open Defecation Free activities implemented for Nashik

Under the Swachh Bharat Abhiyan, Toilets were personally constructed to 7932 families in Nashik Municipal Corporation. ODF++ has been declared by the State Government of Nashik Municipal Region. According to the circular, after Open defecation free of city to maintain the status of independent city free from Open defecation, the rules for granting ODF++ and 3 star statuses of the cities were implemented by the State Government. All those governing instructions are implemented in order to get ODF++ and 3 star status in the city. Nashik city has been declared ODF++ and 3 star status in Nashik Municipal Corporation approved by the General Assembly resolution No. 136, dated 19.11.2018.

ii) Information about the scheme For personal toilets

Swachh Bharat Abhiyan (Civil) of the Central Government provides the facilities of toilet in order to prevent the problems related to the environment and the health of all the citizens in the city and to ensure that waste is safely and properly managed and 'Ghar Tithe Shochalya' concept was brought up on the basis of the principles of Swachh Bharat Mission (Civil)', Government is going to give subsidy.



To increase the number of household individual toilets to ensure that waste is safely and properly managed. Government ensures subsidy under the Swachh Bharat Mission.

Accordingly, prepare the work done by the eligible beneficiaries and surveyed. In the first week of the particular toilet construction Rs.6000/- and the remaining Rs. 6000/ - after construction. That's the total number. Rs 12,000/- is payable. At present, the construction of the household toilet of 7932 families of Nashik Municipal Corporation has been completed. Nashik Municipal Corporation ODF + has been announced through the state government.

iii) Special Activities implemented under cleanliness campaign

All the places owned by Municipal Corporations include jogging tracks, playgrounds, schools, toilets, halls, vegetable market; various public messages were painted on the wall under the follower of Swachh Sarvekshan 2020.

Cleanliness of the road side by way of lifting of the soil in the pavement, road divider along the road in the Nashik municipal area. Similarly, the work done to repair the roads, attached roads, to the toilets of the city was met.

11.5 List of Online Services Provided by NMC

Under Urban Governance NMC has provided the below online services for the citizens

- ❖ Property Tax
- ❖ Water tax
- ❖ E-Tender
- ❖ Birth and Death Certificate
- ❖ Building Permission
- ❖ Local Body Tax (LBT)
- ❖ Grievance Management
- ❖ RTI online
- ❖ Marriage Registration
- ❖ Health Card
- ❖ File tracking



- ❖ Sports facility booking

I - Impact

1. Scarcity of land for processing of solid wastes- Increase in population growth & urbanization enhance prices of land, resulting in scarcity of land for solid waste management.
2. Generation of leachate from solid waste during rainy season causes water & soil pollution and nuisance of flies, while open dumping of solids wastes generates methane gas that ultimately affects environment.
3. People working on solid waste, like rag pickers are ignorant about hazardous health effect of solid wastes. Usually they do not use hand gloves, gum shoes and other safety measures, causing infection of various serious diseases.
4. The quantity of solid wastes increases day by day due to population growth & urbanization in NMC area.

R - Response

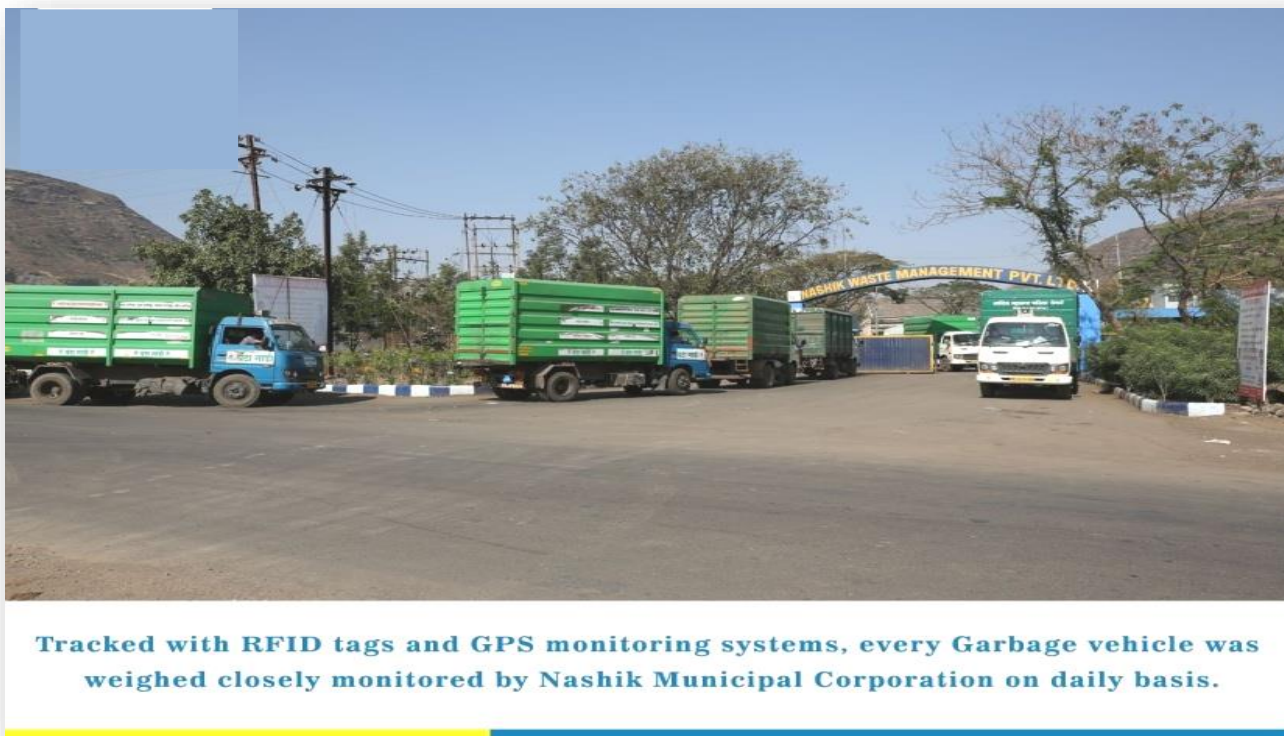
The waste has several components which have potential to be reduced-reused-recycled. This potential is underutilized on account of lack of awareness among generators, lack of sense of ownership and responsibility, lack of sufficient infrastructure. 75 percent of total waste can be reduced from going to landfill by practicing 3R"s This will not only reduce pollution caused by dumping but also make today's waste as tomorrow's resource.

Proposed Initiatives of NMC

- ✓ In NMC area, capping of solid wastes, generated during last 20 years, has been completed in phases I &II
- ✓ NMC has set up Waste to Energy project for food wastes from hotel and residential complexes.



- ✓ NMC has a plan to set up a system for collection of E-Waste. The work is under progress. Special attention has been given towards treatment of solid waste and disposal by scientific method.





Chapter - 12

Ecology and Biodiversity

12.0 Introduction

Ecology

Ecology is the scientific study of interactions of organisms with one another and with the physical and chemical environment. Ecology includes the study of plants and animal populations, plant and animal communities and ecosystems. Ecology is distinguished from natural history, which deals primarily with the descriptive study of organisms. It is a sub discipline of biology, which is the study of life. The ecological studies will help in conservation of nature, wetland management, natural resource management, city planning (urban ecology), community health, economics, basic and applied science and it provides a conceptual framework for understanding and researching human social interactions.

Biodiversity

Biodiversity is defined as the variability among living organisms from all sources including, inter alia, terrestrial, marine and other aquatic ecosystem and the ecological complexes of which they are part. This includes diversity within species, between species and of ecosystems. Biodiversity forms the foundation of the vast array of ecosystem services. Biodiversity is important in human managed as well as natural ecosystems. Decisions humans make that influence biodiversity affect the well being of themselves and others. Biodiversity has three essential elements i.e. Genetic Diversity, Ecosystem diversity and Species diversity.

Urban biodiversity and ecosystem services can play a critical role in reducing the ecological footprints of cities while enhancing resilience, health, and quality of life for their inhabitants. Investing in nature-based solutions can offer a valuable return for cities and urban areas, which is demonstrated by a diversity of examples the Cities and Biodiversity Outlook has compiled from different parts of the world. Biodiversity and ecosystem services are critical natural capital. Valuing ecosystems in both monetary and non-monetary terms is an important tool for mainstreaming ecological considerations into the management of a city.



By illustrating that natural capital contributes to job creation, that it is a cost effective alternative, and it complements services already provided by municipalities such as disaster-risk management and food security, municipal leaders can be encouraged to make decisions that favour the environment rather than harm it.

Urban ecosystem services and biodiversity can help contribute to climate change mitigation and adaptation. Cities contribute to 60-70% of global greenhouse gas emissions. Investing in urban biodiversity and ecosystem services, can play an important role in mitigating and adapting to climate change. Urban green spaces, such as parks, agriculture, residential lawns and roof gardens can increase carbon storage and uptake, as well as significantly contribute to cooling the city. Blue spaces, such as functional watersheds, provide access to safe water for drinking and irrigation. Increasing the biodiversity of urban food systems can enhance food and nutrition security. The capacity of urban, peri-urban, and rural areas for developing greater food self-reliance needs to be considered within a local biodiversity context, and investments are needed to protect local plant and animal species. Local alternatives can reduce vulnerability to global shocks and counterbalance price and supply volatility as well as reduce the ecological footprint of cities. Ecosystem services must be integrated in urban policy and planning. Urban policy and planning provide opportunities to integrate biodiversity conservation into the design, building codes, zoning schemes, spatial plans, strategic choices, and enforcement of city management. The practice of urban planning, which can range from green infrastructures to promotion of organic and environmentally friendly products and services, is widely recognized as a vehicle for securing the long-term public good at the city scale.

D-Driving Force

Factors Affecting Biodiversity (Driving Force)

- ✓ Demand of increasing residential areas due to escalation of human population and urbanization
- ✓ Indiscriminate growth of industries causing pollution (air, water, noise and soil)
- ✓ Sedimentation of sludge and disposal of wastes in water bodies



S-Status

Biodiversity in NMC area (Status)

The goal is to work on, prepare a biodiversity register, to keep record of traditional focus on biodiversity, biodiversity protected area, follow the commercial rule etc. the managing committee will guide this body on maintaining the city's ecological balance. The committee will be helpful in mapping the city's biodiversity and planning measures to conserve the flora and fauna. The centre has formulated a law for maintaining ecological balance and made it compulsory for states to implement it at the local governing body level. The aim of the committee is to conduct ecological surveys like the tree census. The survey will include types and number of birds, animals etc., in the city.

12.1 Terrestrial biodiversity in city

Gardens

There are 493 gardens having a total area of 1384753.97 sq.m. in NMC area. The Garden department of NMC works towards maintaining and increasing the open and green spaces of the city. Some specialized and popular gardens; such as, Pandit Jawaharlal Nehru Botanical Garden, Butterfly Garden, Dadasaheb Falke Smarak, Shivaji Udyan, Goda Park, Somani Garden, Nehru Garden, Pramod Mahajan Garden, etc.

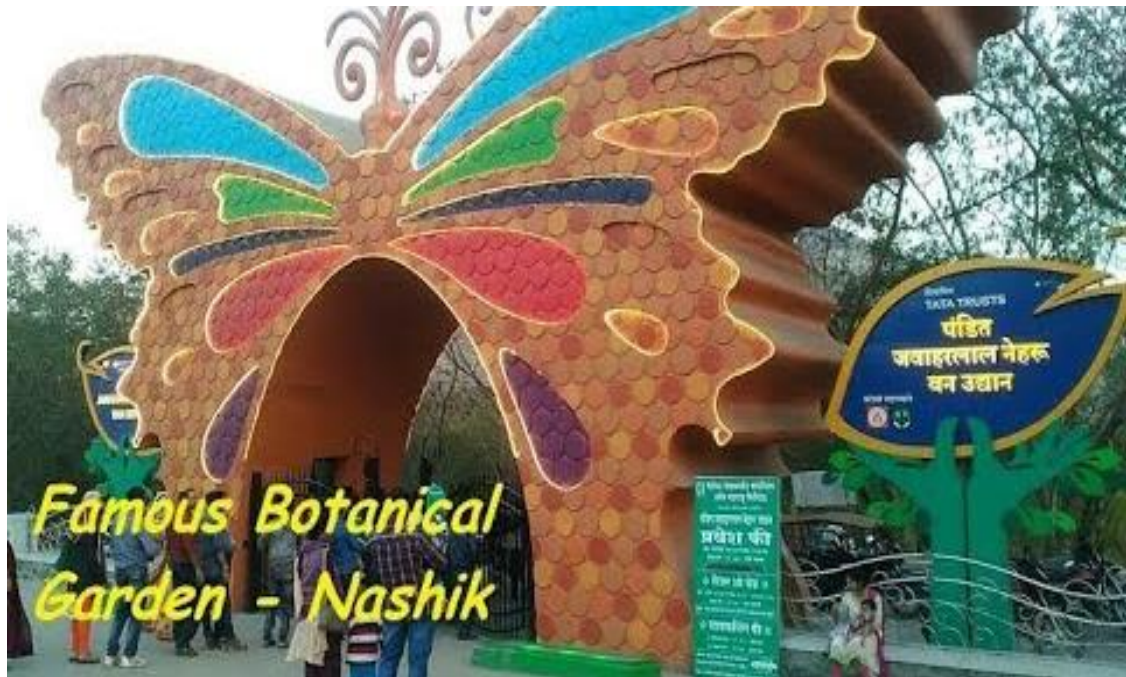
Table 12.1 - Information of Gardens in Nashik City

Sr. No.	Name of Division	Total No. Garden	Area in sq.m.
1.	Nashik West	57	160250.5
2.	Nashik East	72	288319.43
3.	Nashik	160	303928.45
4.	New Nashik	72	219702.61
5.	Satpur	42	187513.20
6.	Panchwati	90	225039.78
	Total	493	1384753.97

Source: Garden Department, NMC



A) Botanical/ Butterfly Garden



B) Pramod Mahajan Garden





C) Phalake Smarak Udyan



D) Goda Park



12.2 Comparative characteristics of various gardens

A comparative account of the particulars of 5 major gardens, located in Nashik area, is summarized in below table:-



Table 12.2 - List of various Gardens in NMC

S. No	Name of the garden	Salient Features	Approximately no. of visitors every day
1	Dadasaheb Phalke Smarak	Dedicated to a great visionary and Father of Indian Cinema, Dadasaheb Phalke, the park adds glory to the beauty of Nasik city. Located next to the Mumbai-Agra Highway or NH3 near Pathardi Phata, Nasik, it is the biggest park and is spread across a huge expanse accounting 29 acres & Impressive layout, dinosaur model, lawn, jogging track and waterfall	Five hundred of visitors every day
2	Shivaji Udyan	Being one of the oldest parks in Nasik, Located near the core of city, Central Bus Stand/CBS, Shivaji Park is best option to spend time with your family or friends. You will get several street-food stalls close at hand. Some of them serve mouth-watering Bhel, a sort of Chat, there.	Hundreds of visitors every day
3	Goda Park	Lawn and jogging track	
4	Pramod Mahajan Udyan	One of the most recent public parks in Nasik, Pramod Mahajan Udyan is well-landscaped garden. It has multiple toys for kids, small jogging track for adults and benches to relax for senior citizens.	500+ Visitors per day
5	Somani Garden	Sited near Muktidham, Nashik Road, this garden has seen many generations playing here. The all green public park gains its spirit every day in the evening Impressive layout,	300+ Visitors per day
6	Nehru Udyan	Located on the Pandav Lene Road in Nashik. The butterfly gate, located on the main road connecting Mumbai and Nashik, which gives the message of Nashik's entrance attracts people towards itself. The light and sound show at night with electronically lighted trees and sound of birds is something that pulls visitors towards this garden, The best time to visit the Nehru Van Udyan is during the cool months or spring time. But kids also love visiting this garden during their summer vacations to make the best of their holidays.	400+ visitors every day
7	Amrit Van Udyan, Tavli Phata	One of the most recent public parks in Nasik, Amrut Van Udyan is well-landscaped garden. It is located in Makhmalabad area. The civic body developed the Tavli Amrut Van Udyan. Tavli Amrut Van Udyan is of the best spot of winter season.	200+ visitors every day

Source: Garden Department, NMC



12.3 Tree plantation

During the years 2018-2019, 12000 tree saplings were planted, by NMC. Permissions to cut trees during road widening and other private developments were received subject to plantation of specified number of new saplings.

According to Maharashtra (Urban Area) Tree Protection and Preservation of Trees Rules, 2009 Ref. Article 16; Municipal Corporations are expected to plant at least 10,000 trees in each year. NMC Tree Authority has laid down following guidelines for tree plantation by private developers.

1. For constructions on plots up to 500 sq.m area, 1 tree is to be planted every 100 sq.m.
2. One tree is to be planted at every 60 sq.m for a proposed construction on a plot of 500 sq.m to 2000 sq.m.
3. For proposed construction on plots greater than 2000 sq m., 1 tree is to be planted for every 80 sq.m.
4. Specifications for planting only indigenous species of saplings, as well as minimum distance from roads are also specified amongst others.

12.4 Plantation scheme

According to the provisions of Maharashtra (Urban Areas) Protection and Preservation of Trees Act 1975 and Hon'ble High Court, computerized system has been started to calculate all the trees existing in the city and counting of 25 lakh trees is planned. But when actual tree counting started, it was observed that the number of trees in the Nashik city area has increased and the tree count is likely to be exceed 25 lakhs. The planning is to be done to complete the desired tree plantation for this year. During the year 2017, a total of 12000 endemic tree plantation of nearly 10 feet height have been completed in the Nashik Municipal Corporation area, and the maintenance of the trees should be done for one to five year span.

Pandit Jawaharlal Nehru Park has been developed near Pandav leni on 35 acres of forest area by Nashik Municipal Corporation under CSR fund with Tata Trust, Mumbai, where various types of landscapes and laser shows have been developed.

An amount of Rs 13.50 crores have been sanctioned in the 2018-19 budget for the development of capital works. In the last financial year, there has been an increase of over Rs. 9.51 crores. A total amount of Rs. 26.32 crores has been approved in 2018-19 budget. There has been an increase by 53.22% from the last year.



Table 12.3 - Tree plantation scheme by NMC

Sr. No.	Ward	Species Planted	No. of trees Planted	Survival Plants
1	East	Spanish Cherry, Tree Jasmine, Silver Oak, Cotton Tree, Mahogany, Saptaparni, Kadam	2017	1593
2	West	Saptaparni, Kadam, Spanish Cherry, Mahogany, Banyan, Peepal, Tebebuia, Silver Oak	1931	1596
3	New Nashik	Saptaparni, Kadam, Tree Jasmine, Mahogany, Banyan, Peepal, Tebebuia, Bahunia Racemosa, Silver Oak	2009	1845
4	Satpur	Saptaparni, Kadam, Mahogany, Peepal, Tebebuia, Bahunia Racemosa, Silver Oak	2016	1824
5	Nashik Road	Saptaparni, Kadam, Mahogany, Peepal, Tebebuia, Bahunia Racemosa, Silver Oak, Almond Tree, Karanja, Orchid, Mango	2239	2297
6	Panchawati	Kadam, Tree Jasmine, Mahogany	2282	2321

Source- Garden Department, NMC Municipal Corporation.



Table 12.4 - Flora in different gardens

Sr. no.	Particulars	No of flora
1.	Total number of trees	34125
2.	Total number of exotic trees	4125
3.	Total number of indigenous trees	30,000

Source-Garden Department, NMC Municipal Corporation

Table 12.5 - Tree Species found in NMC area

Sr. No.	Scientific Name	Local Name	Family
1.	<i>Acacia catechu/acacia sundra</i>	Khair	Leguminosae
2.	<i>Acacia cordofolia</i>	Haldu	Fabaceae
3.	<i>Acacia leucophloea</i>	Hiwar	Fabaceae
4.	<i>Acacia nilotica</i>	Babhul	Leguminosae
5.	<i>Adonsoniadigitata</i>	Gorakhchinch	Bombacaceae
6.	<i>Aegle marmelos</i>	Bel	Rutaceae
7.	<i>Albizziaamara</i>	Shirish kala	Fabaceae
8.	<i>Albizzialebeck</i>	Shirish	Mimosaceae
9.	<i>Albizziascholaris</i>	Satwin	Fabaceae
10.	<i>Albizziaprocera</i>	Kinai	Fabaceae
11.	<i>Aphanamixixpolystachya</i>	Rohitak	Meliaceae
12.	<i>Annona reticulata</i>	Ramphal	Annonaceae
13.	<i>Anogeissus acuminata</i>	Mahadhavada	Combretaceae
14.	<i>Anogeissuslatifolia</i>	Dhavda	Combretaceae
15.	<i>Arthocarpusheterophyllus</i>	Phanas	Moraceae
16.	<i>Azadirachtaindica</i>	Kadulimb	Meliaceae
17.	<i>Bauhinia purpurea</i>	Raktkanchan	Fabaceae
18.	<i>Bauhinia racemosa</i>	Aapta	Fabaceae
19.	<i>Bauhinia semla</i>	Semla Kanchan	Fabaceae
20.	<i>Bauhinia tomentosa</i>	Pivla Kanchan	Fabaceae
21.	<i>Bauhinia variegata</i>	Kanchan	Fabaceae
22.	<i>Bombaxceiba</i>	Katesawar	Malvaceae
23.	<i>Buchananiacochinchinensis</i>	Charoli	Anacardiaceae
24.	<i>Butea monosperma</i>	Palas	Fabaceae
25.	<i>Careyaarborea</i>	Kumbha	Lecithidaceae
26.	<i>Cassia fistula</i>	Wahwa	Fabaceae
27.	<i>Cochlospermumreligiosum</i>	Somsawar	Bixaceae



28.	<i>Cocusnucifera</i>	Naral	Areaceae
29.	<i>Cordia dichotoma</i>	Bhokar	Boraginaceae
30.	<i>Crataevanurvala</i>	Wayvarna	Capparaceae
31.	<i>Crescentia cujete</i>	Wadga/kalabash	Bignoniaceae
32.	<i>Dabergiasisso</i>	Sissoo	Fabaceae
33.	<i>Dalbergialatifolia</i>	Sisam	Fabaceae
34.	<i>Dilleniaceiba/indica</i>	Karmal	Dilleniaceae
35.	<i>Diospyrosmalabarica</i>	Temru	Ebenaceae
36.	<i>Drypetesroxburghii</i>	Putramjiva	Euphorbiaceae
37.	<i>Dyospyrosembriopteris</i>	Tembhurni	Ebenaceae
38.	<i>Erythrinavariegata</i>	Pangara	Fabaceae
39.	<i>Ficusamplissima</i>	Paypar	Moraceae
40.	<i>Ficusarnottiana</i>	Payar	Moraceae
41.	<i>Ficusasperimma</i>	Kharoti	Moraceae
42.	<i>Ficusbengalensis</i>	Wad	Moraceae
43.	<i>Ficuselastica</i>	Rubber	Moraceae
44.	<i>Ficusglomerata</i>	Umbar	Moraceae
45.	<i>Ficushispida</i>	Umbar Kala	Moraceae
46.	<i>Ficuskrishnae</i>	Krushnawad	Moraceae
47.	<i>Ficusmicrocarpa</i>	Nandruk	Moraceae
48.	<i>Ficusreligiosa</i>	Pimpal	Moraceae
49.	<i>Ficustiela</i>	Pimparan	Moraceae
50.	<i>Gmelinaarborea</i>	Shivan	Verbenaceae
51.	<i>Grewiatiliaefolia</i>	Dhaman	Tiliaceae
52.	<i>Hardwckiabinata</i>	Anjan	Caesalpiniaceae
53.	<i>Holarhhenaantidysenterica</i>	PandhraKuda	Apocynaceae
54.	<i>Holoptriaintegrifolia</i>	Wawar	Ulmaceae
55.	<i>Khaya Grandis</i>	Mohgani/Chhaya	Meliaceae
56.	<i>Lagestromiareginaea / Speciosa</i>	Taman	Lythraceae
57.	<i>Limoniaaciddissima</i>	Kavath	Rutaceae
58.	<i>Madhukalongifolia</i>	Moh	Sapotaceae
59.	<i>Mangiferaindica</i>	Aamba	Anacardiaceae
60.	<i>Manilkarahexandra</i>	Kirni	Sapotaceae
61.	<i>Melia azedarach</i>	Bakan Neem	Meliaceae
62.	<i>Melia dubia</i>	Maha Neem/Limbara	Meliaceae
63.	<i>Memecylonumbellatum</i>	Anjani	Melastomataceae



64.	<i>Mesuaferrea</i>	Naagkeshar	Calophyllaceae
65.	<i>Micheliachampaka</i>	Pivlachafa	Magnoliaceae
66.	<i>Mimusopselengi</i>	Bakul	Sapotaceae
67.	<i>Mitragynaparvifolia</i>	Kalam	Rubiaceae
68.	<i>Morindapubescens</i>	Bartondi	Rubiaceae
69.	<i>Murrayapaniculata</i>	Kunti/Kamini	Rutaceae
70.	<i>Muntingiacalabura</i>	Cherry	Muntingiaceae
71.	<i>Neolamarckiacadamba/Anthoc ephalms</i>	Kadamb	Rubiaceae
72.	<i>Nyctanthes arbor-tristis</i>	Parijatak	Oleaceae
73.	<i>Oroxylamindicum</i>	Tiwas	Bignoniaceae
74.	<i>Ougeiniaoogenense</i>	Tetu	Fabaceae
75.	<i>Parkiabiglobosa</i>	Tiwas/Kala Palas	Fabaceae
76.	<i>Phyllanthusemblica/Emblica officinalis</i>	Chenduphali	Phyllanthaceae
77.	<i>Pongamiapinnata</i>	Aawla	Fabaceae
78.	<i>Populus spp</i>	Popular	Salicaceae
79.	<i>Prosopis cineraria</i>	Karanj	Fabaceae
80.	<i>Pterocarpusacerifolium</i>	Muchkund	Malvaceae
81.	<i>Pterocarpus marsupium</i>	Bija/Bibla	Fabaceae
82.	<i>Pterocarpussantalinus</i>	Raktchandan	Fabaceae
83.	<i>Salix tetrrasperma</i>	Walunj	Salicaceae
84.	<i>Salix tetrrasperma</i>	Walunj	Salicaceae
85.	<i>Sapinduslaurifolius</i>	Ritha	Sapindaceae
86.	<i>Saracaindica</i>	Seeta Ashok	Fabaceae
87.	<i>Schreberasweitenioides</i>	Murwa	Oleaceae
88.	<i>Semecarpusanacardium</i>	Bibba	Anacardiaceae
89.	<i>Steculiaurens</i>	Kahandal	Malvaceae
90.	<i>Sterculiafoetida</i>	JungliBadam	Malvaceae
91.	<i>Stereospermumchelonoides</i>	Padal	Bignoniaceae
92.	<i>Syzygiumcumini</i>	Jambhul	Myrtaceae
93.	<i>Tarmarindusindica</i>	Chinch	Fabaceae
94.	<i>Tectonagrandis</i>	Saap	Lamiaceae
95.	<i>Terminalia arjuna</i>	Arjun	Combretaceae
96.	<i>Terminalia bellirica</i>	Behda	Combretaceae
97.	<i>Terminalia chebula</i>	Hirda	Combretaceae
98.	<i>Thespesipopulnea</i>	Ranbhendi	Malvaceae



99.	<i>Wrightiaincitoria</i>	Kalakuda	Apocynaceae
100.	<i>Zizyphusmauritiana</i>	Bor	Rhamnaceae

Source-Garden Department, Nashik Municipal Corporation

12.5 Terrestrial fauna & Aquatic Environment

A) Terrestrial fauna

Being a significant part of the ecosystem, fauna has a great role towards control and balance of the environment. If any of the species become extinct, the whole ecosystem may be in danger. Field observations of representative fauna, particularly avifauna and butterflies, were undertaken in NMC area.

B) Butterfly

Butterflies and moths are important, both in their own right but also as quality of life indicators. There are many intrinsic and aesthetic values of butterflies as follows.

- Butterflies and moths are intrinsically valuable and are worthy of conservation in their own right.
- Butterflies and moths are part of life on earth and an important component of its rich biodiversity.

As per the study conducted, 24 species of butterflies were recorded in NMC area e.g. Indian crow, blue tiger and grass yellow butterfly. None of them, except common Indian crow (*Euploea core*), and are enlisted as sensitive, as per the Wildlife (Protection) Act, 1972. Common Indian crow is enlisted under schedule IV of the Wildlife (Protection) Act, 1972. A detailed list of species recorded during survey is presented in **Table 12.5**



Blue tiger



Common grass yellow



Common Indian crow

Fig 12.1- Common types of butterflies found in city



In this area the diversity of butterfly appears to be good. The varieties are common in most parts of the Western Ghats of India. Increased butterfly populations indicate good plant diversity and other pollinator groups within the area.

Table 12.6 - Checklist of butterflies recorded in the NMC area

Sr. No.	Scientific Name	Common Name
1.	<i>Papiliopo lymnestor</i>	Blue Mormon
2.	<i>Junoni aorithya</i>	Blue pansy
3.	<i>Tirumala limniace</i>	Blue tiger
4.	<i>Melanitisleda</i>	Common evening brown
5.	<i>Euremahecabe</i>	Common grass yellow
6.	<i>Euploea core</i>	Common Indian crow
7.	<i>Phalantaphalantha</i>	Common leopard
8.	<i>Papiliopolytes</i>	Common mormon
9.	<i>Junoniaatlites</i>	Gray pansy
10.	<i>Papiliodemoleus</i>	Lime butterfly
11.	<i>Danauschrysippus</i>	Plain tiger
12.	<i>Ionolyce helicon</i>	Pointed line blue
13.	<i>Talicaadanyseus</i>	Red pierrot
14.	<i>Euremabrigitta</i>	Small grass yellow
15.	<i>FlathaAlispi</i>	Small leopard
16.	<i>ColotisErdia</i>	Small orange tip
17.	<i>Junonia Viyarita</i>	Yellow Fansy

B) Birds

- Birds play a vital role in various ecosystems. Their diversity is an indication of congenial habitat for survival.
- Avifauna is an important part of the ecosystem, playing various roles as scavengers, Pollinators, predators of insect, pest, etc.
- They are the bio-indicators of different status of Environment like urbanization, Industrialization and human disturbance. The areas having good bird diversity signifies Healthy forest. They can be sensitive indicators of pollution problems and function as early warning system. A list of the birds observed in the area is recorded in **Table 12.9**.

DPSIR Indicator for 'Green Spaces' illustrates that green parks, green lands, open areas and playgrounds, play an important role for the city environment. Green spaces symbolize peace, minimal stress and a cleaner environment for many people.



Following conclusions were made from the study:

- A total of 28 bird species, including aquatic birds were recorded. None of these birds are endangered (Sch-I) as per Wildlife (Protection) Act, 1972.
- The birds like Indian myna, house crow, blue rock pigeon, red whiskered bulbul, purple sun bird, Indian black drongo, cattle egret, small green bee eater, etc. were recorded in all the locations surveyed.

An objective of this indicator is to provide as many parks, green lands, open areas and play grounds in a city as possible. Green spaces in urban areas are important for recreational purposes and for generally enhancing the quality of life of people who live in urban areas.



Small Green Bee eater



Magpie Robin Indian



Black Dragon



House Sparrow

Fig 12.2 - Common types of Avifauna found in city



Table 12.7 - Avifauna found in NMC

Sr. No.	Common name	Scientific name	Local Name
1.	Barheaded geese	<i>Anserindicus</i>	Rajhans
2.	Black kite	<i>Milvus migrans</i>	Ghar
3.	Black winged stilt	<i>Himantopus himantopus</i>	Shekotya
4.	Blue rock pigeon	<i>Columba livia</i>	Nil Kastur
5.	Cattle egret	<i>Bubulcus ibis</i>	GaiBagala
6.	Common babbler	<i>Turdoidescaudatus</i>	SamanyaSatbai
7.	Common swallow	<i>Hirundinurustica</i>	Pakoli
8.	Crow pheasant	<i>Centropus sinensis</i>	Bhardhwaj
9.	Yellow headed wagtail	<i>Motacilla citreola</i>	Piwala dhobi
10.	Grey heron	<i>Ardea cinerea</i>	RakhiBagala
11.	House crow	<i>Corvus splendens</i>	Kawala
12.	House sparrow	<i>Passer domesticus</i>	Chimani
13.	Lime butterfly	<i>Papilio demoleus</i>	Limboli
14.	Red pierrot	<i>Talica adanyseus</i>	Lalzenda
15.	Indian baya	<i>Ploceus philippinus</i>	Sugran
16.	Indian black drongo	<i>Dicrurus adsimilis</i>	Kotwal
17.	Indian cuckoo	<i>Cuculus micropterus</i>	Kokil
18.	Indian myna	<i>Acridothera tristis</i>	Maina
19.	Indian plover	<i>Charadrius dubius</i>	Chikhalya
20.	Indian reef heron	<i>Egretta garzetta</i>	SamrudiBagala
21.	Indian robin	<i>Saxicola leucurus</i>	BhartiyDayal
22.	Indian roller	<i>Coracias benghalensis</i>	BhartiyPankh
23.	Jungle crow	<i>Corvus macrorhynchos</i>	Domkawala
24.	Little cormorant	<i>Phalacrocorax niger</i>	ChotaPankawala
25.	Magpie robin	<i>Copsychus saularis</i>	Dayal
26.	Pond heron	<i>Ardeola grayii</i>	Dhokari
27.	Purple sunbird	<i>Nectarinia asiatica</i>	JambhalaShinjir
28.	Redvented bulbul	<i>Pycnonotus cafer</i>	Lalbudya Bulbul
29.	Redwattle d lapwing	<i>Vanellus indicus</i>	Titawi
30.	Redwhiske red bulbul	<i>Pycnonotus jocosus</i>	Shipai Bulbul
31.	Roseringed parakeet	<i>Psittacula krameri</i>	Popat
32.	Small blue kingfisher	<i>Alcedo atthis</i>	Khandya - NilaDhiwar
33.	Small green bee eater	<i>Merops orientalis</i>	Yeda Raghu
34.	White breasted kingfisher	<i>Halcyon smyrnensis</i>	PandharyaChatichaDhiwar

Source – Garden Department , NMC



S-Summary

- ❖ Total 493 nos. of garden are developed in NMC area.
- ❖ Total area of Garden is 1384753.97 sq.mt.
- ❖ From 2018-19, total 12000 trees are planted.
- ❖ Per hect. 1320 nos. of trees is planted but the quantity of trees seems to be very low. Therefore, plantation of 2000-2500 nos. per hect. of trees is very essential. It should be noted that some plants do not get developed.
- ❖ In NMC area inspection for birds & butterflies. Birds & butterflies is imp. in env. Total 14 no. of butterflies of 24 species are seen. Therefore it can be said that good kind of butterfly diversity in the area is observed.
- ❖ The area in which Biodiversity is more, that area indicates ecological sustainability of life.
- ❖ In the area 34 nos. of birds are listed under the wildlife Act 1972 as endangered/protected birds, which were not observed in NMC area.
- ❖ On biodiversity potential effect & impact are given below-
 1. Growth of people
 2. Fast growth of urbanization
 3. Increased industry
 4. Lack of citizen awareness
 5. Sewage release in water
 6. Lack of solid waste & disposal.

Therefore these above points are harmful to Environment. They have an effect on biodiversity.



Chapter - 13

Disaster Management

13.0 Introduction

Disaster is a serious disruption of the functioning of a society, causing widespread human, material, or environmental losses which exceed the ability of the affected society to cope using its own resources.

Disaster Management can be defined as the association and management of resources and responsibilities for dealing with all humanitarian aspects of emergencies, in particular preparedness, response and recovery in order to lessen the impact of disasters.





Fig 13.1 - Disaster Management in NMC



D- Driving Forces

Factors affecting Disasters (Driving force)

1. Rapid urbanization
2. Poverty
3. Lack of information/awareness
4. Population growth
5. Environmental Degradation

P- Pressure

Possible changes in Environment due to identified driving forces (Pressure)

1. Rapid urbanization:

Everybody wants to settle in urban area but due to higher rates it can't be possible for every individual of every class to get accommodated. It results in growth of slums, unplanned construction without regulations.

2. Poverty:

Lack of resource bases, Support System, Insurance Opportunities

3. Lack of information/awareness:

Centralized information is helpful only for a certain range of the population, particularly Government. Lack of knowledge in evacuation, First Aid, Rescue etc. and literacy.

4. Population growth:

Effect on the people living in crowded areas.



13.1 Major phases of Disaster management Cycle:

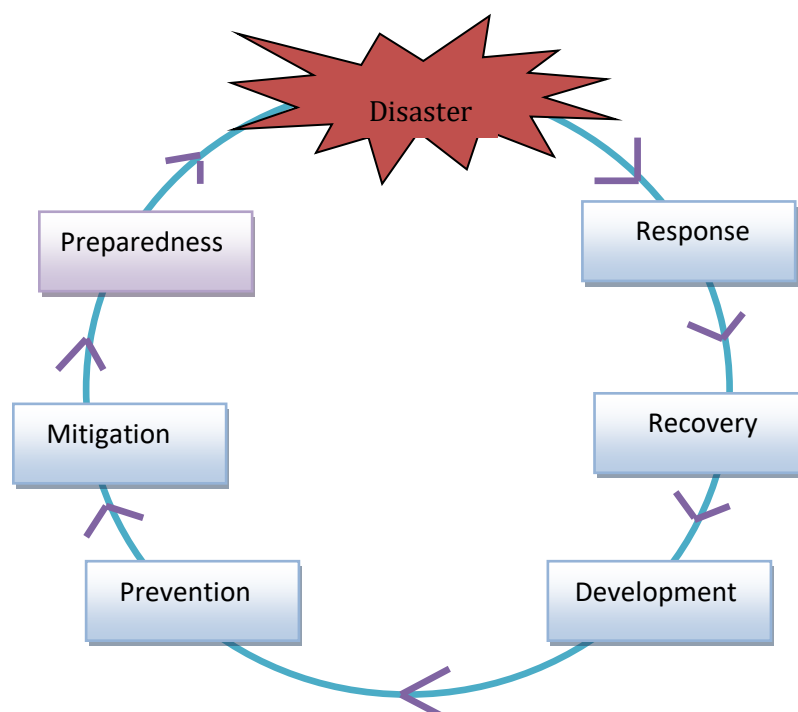


Fig 13.2 - Disaster management cycle

Table 13.1 - Key Stages of Disaster Management 1:

Pre Disaster (Before a disaster to reduce the potential for human, material, environmental losses caused by Hazards and to ensure that these losses should be minimized when the disaster actually strikes)	Prevention and Mitigation	The term prevention is often used to embrace wide diversity of measures to protect persons and property in case of disasters. Mitigation embraces all measures taken to reduce both the effects of the hazard itself and the vulnerable conditions in order to reduce the scale of a future disaster.
	Preparedness	The process embraces measures that enable Governments, Communities and individuals to respond rapidly to Disaster situations to cope with them effectively. Preparedness includes the formulation of viable emergency plans, the development of warning systems, the maintenance of inventories and the training of personnel.
	Early warning	This is the process of monitoring situations in communities or areas known to be vulnerable to slow onset hazards, and passing the knowledge of pending hazard to people.
	The Disaster event	This refers to real time event of a hazard occurring and affecting elements at risk. The duration of the event will depend on the type of threat; ground shaking may only occur for a matter of seconds during an earthquake while flooding may take place over a longer sustained period.



Table 13.2 - Key Stages of Disaster Management 2:

<p>During Disaster (It is to ensure that the needs of victims are met to minimize suffering)</p>	<p>Response and Relief</p>	<p>This refers to the first stage response to any calamity, which includes setting up control rooms, putting the contingency plan in action for evacuation, taking people to safer places, rendering medical aid to the needy etc simultaneously rendering relief to the homeless, water, clothing etc, to the needy, restoration of communication, disbursement of assistance in cash or kind.</p>
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Table 13.3 - Key Stages of Disaster Management 3:

<p>Post Disaster (After a disaster to achieve rapid and durable recovery which doesn't reproduce the original vulnerable conditions)</p>	<p>Recovery</p>	<p>Recovery is used to describe the activities that encompass the three overlapping phases of emergency relief, rehabilitation and reconstruction.</p>
	<p>Rehabilitation</p>	<p>Rehabilitation includes the provision of temporary public utilities and housing as interim measures to assist longer -term recovery.</p>
	<p>Reconstruction</p>	<p>Reconstruction attempts to return communities to improved Pre-Disaster functioning. It includes the replacement of buildings, infrastructure and lifeline facilities so that long term development prospects are enhanced rather than reproducing the same conditions which made an area or population vulnerable in the first place.</p>
	<p>Development</p>	<p>In an evolving economy, development process is an ongoing activity. Long term prevention/Disaster reduction measures like construction of embankments against flooding, irrigation facilities as drought proof in measures, increasing plant cover to reduce the occurrences of landslides, land use planning, construction of houses capable of withstanding the onslaught of heavy rains wind speed and shocks of earthquakes are some of the activities that can be taken up as part of development plans.</p>



S-Status

Table 13.4 - Disaster Management Team and Equipments available with NMC are as follows.

S. No	Activity	Particulars	
1	Total no of DMP cells in NMC	1 No. Centralized	
2	No of QRT teams/trained manpower in rescue, fire fighting, first aid, evacuation etc. in Industries trained by NMC fire brigade or available during disasters for NMC assistance.	1. No independent QRT teams. Entire Fire Dept employees are trained for all sorts of emergencies and everybody on duty responds to any emergency. 2. Pvt companies have their own trained fire personnel who work in coordination with fire dept.	
3	No. of lifesaving boats, aerial ladder platform, availability of helicopter for evacuation.	Life Saving IR Boats (Rubber Boats) – 02 nos. Life jackets – 94 nos. Ropes – 83 Fire suits – 125	
4	What type of training program taken against natural and manmade threat/bomb plantation/riots	Combined Training programmers and Exercises of CBRN, Fire, Flood Rescue, etc taken and trainees are sent to the national fire brigade services college at Nagpur for every year.	
5	Fire Stations in NMC Region	Total 6 fire stations are provided in NMC region. Total 147 employees working in these fire stations 1. Main Fire Station at Shingada Talav 2. Panchavati fire Station 3. New Nashik fire Station 4. Satpur fire Station 5. Nashik Road fire Station 6. Tapovan Sadhugram fire station	
		Flood Rescue Van	01
		Water Bowser	14
		Rescue Van	01
		Rubber boat	02
		Life jackets	94
		Ropes	83
		Portable pump (diesel)	00
		Portable pump (Petrol)	09
		Wood cutter chain	19
		Fire boat	02



		OBM	05
		Life rings	140
		Hooks	11
		BA sets (45 min)	28
		Smoke extractor	01
		Fire suits	125
		Pelican flood light	00
		Light tower	01
		Air lifting bags	04
		Chemical suits	08
7	Aerial Ladder Platform BRONTO SKYLIFT – RLX 55	DOP – Sep 2013 Use – High Rise Bldg Fire Fighting and Rescue purposes. Working Height – 52 meters (effective) i.e. upto 17th floor.	
8	Information regarding fire brigade	Details	2019-20
	As per zonal offices (A, B, C, D, E, F)	Total no of fire station	No 06 (in words- six fire station)
		Total employee count	Chief Fire Officer -
			Station officer 01
			Sub officer 04
			Leading firemen 18
			Firemen 93
			Driver 27
			Total no of employees 143
	Available instruments and their count,		Water tender, Devdut rescue vehicle, Rescue van, Bullet etc. 09
			Mega bowser 02
			Bowser 03
			“Devdut” rescue vehicle 03
			Mini water mist 05
			Hydraulic platform 01
			Rescue van 01
			Flood rescue 01
			Hazmat rescue van 01
			B. A. van 01
			Bullet 02
			Car 01
			Jeep 01
			Total vehicles 31

Source:-Disaster Management & Fire Brigade Dept NMC



Table 13.5 - Some important services & instruments being provided by Disaster management department

Sr. no.	Description of Disaster	Description of instrument being used		
1.	Immediately rescuing people trapped under vehicle in accident scenario	Weight lifting Bags		
		Capacity	Total Quantity	
		1)	1.2 ton	1 unit
		2)	32.6 ton	1 unit
		3)	40.7 ton	1 unit
4)	68 ton	1 unit		
2.	Opening blocked doors in emergency situation	Door breaker		
3.	Equipments being used for expeditious rescue of life and avoiding financial loss after accidents involving concrete slabs, big trees, advertisement boards, large vehicles.	Steel/ wood cutter, concrete cutter, spreader, cutting tools		
4.	For rescue operations in dark (Lighting arrangement)	High mast (Made- AASKA), Torch		
5.	Search of survivor in room or confined area having smoke due fire incident	Respiratory Instrument (B. A. Set)		
6.	Immediate search of survivor at fire or accidental spot	Conducting room search (Crawling Method)		
7.	Rescue of life at fire scene	Fire Entry Suit		
8.	For aid of security personals working at rescue mission at incident of Chemical leakage	P.P.E. (Gumboots, Goggles, Chemical Suits, Hand gloves)		
9.	Rescuing personals trapped on top floor of high rise building	Hydraulic platform		
10.	Rescuing personals trapped under concert slab by cutting the slab in minimal time	Concert cutter		
11.	Arresting fire over maximum possible area with minimum usage of water	Water spray system		

Source:-Disaster Management & Fire Brigade Dept NMC



I-Impact

Serious major event happened in NMC -

1. In year 2016, Godavari water level raised and caused flash flood situation. Disaster management team rescued people from this situation.

R-Response

Disaster Management planning Activities undertaken in NMC:

NMC follows below activities for Disaster Management.

- A. Training Programmes.
- B. Awareness.
- C. Mock drills.
- D. Combined exercises.
- E. Special rescue operations.

Flood & Fire rescue and rescue training in NMC

The work of the volunteers during any event is to assist the administration in making arrangements, crowd management and other services. The volunteers play a major role during emergencies such as drowning, electrical shock, accidental injuries and rescue operations during floods and fires.

If guidance & training is provided to every citizen / civilian of every city and villagers, it can be REAL Fire Safe INDIA. Fire Brigades & other civic authorities can take up the initiative towards Fire & Life Safety training to maximum possible citizens so they can behave in proper manner as First Responder to any emergency evacuation & rescue situations. Even principally if such training is given in school life, it will be more beneficial. Safety can be introduced as the subject for the coming generation; Elderly can be trained in various Safety programme.



Fig 13.3 - Images of Training programs on Disaster management

Awareness & Mock drills

NMC has conducted various awareness programs to the citizens, schools, colleges, threat zones on necessary required measures to be followed in minimizing the damage or loss to the human, plants, animals and ecology of environment.





Combine Study (exercise) & Special rescue operations NMC disaster management

Rescue operation team in collaboration with CBRN, Fire, Flood Rescue etc taken with YASHADA, etc has performed a tremendous response and saving the ecology of earth during natural disasters like floods, earth quakes and industrial accidents etc.,

S-Summary

Flood situations happened in NMC



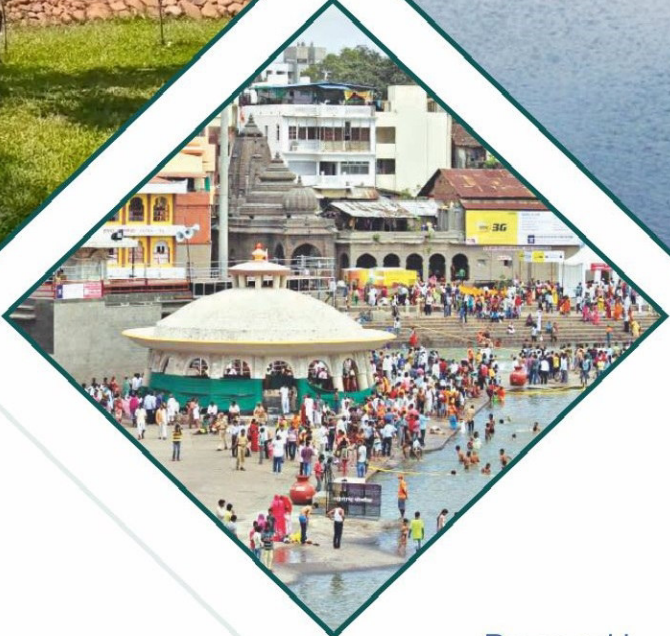
Nashik Municipal Corporation has completed all the preparations to deal with natural calamities due to accumulation of water in the areas along river bank and low lying areas. Considering flood to Godavari, Nandini, Waldevi and Waghadi rivers every year, NMC has kept its mechanism ready. Godavari River had witnessed major flood in 2007-08 and 2016 due to continuous rainfall for 3-4 days and water discharge from Gangapur dam. These floods were considered to be bigger after the major flood in 1961.

During the flood situation last year at Saraf Bazaar, as water level had touched steps of Sarkarwada, Prakash Supariwala shop, losses worth crores of rupees took place. Fire brigade had saved lives of many during this flood. NMC had shifted hundreds of families and had made alternative arrangement for them. Keeping in mind this past experience, the disaster management and fire brigade department has kept all the system ready. Like every year, work plan has been kept ready.



NOTES

- This Environmental Status Report is based on information received from various departments of Nashik Municipal Corporation, Maharashtra State Road Transport Corporation, Regional Transport Office, Maharashtra Pollution Control Board, Maharashtra State Electricity Distribution Company Ltd., Education Department and other sources mentioned.
- Environmental Status Report 2019-20 has been prepared based on the information available on various websites of Government, Semi-Government, Non-Governmental Organizations, Nashik Municipal Corporation, Scientific & Research institutions etc.
- The information is mentioned in the appropriate place with reference. No maps or photographs mentioned in this report are to be used for measuring the scale, and are only for estimation purposes.
- This Environmental Status Report is prepared as per the guidelines issued by Maharashtra Pollution Control Board.



Prepared by



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